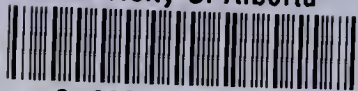
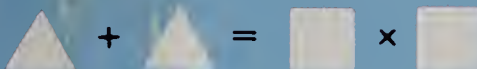
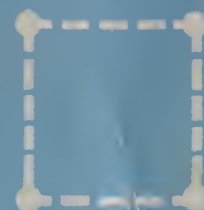


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MATH WORKSHOP

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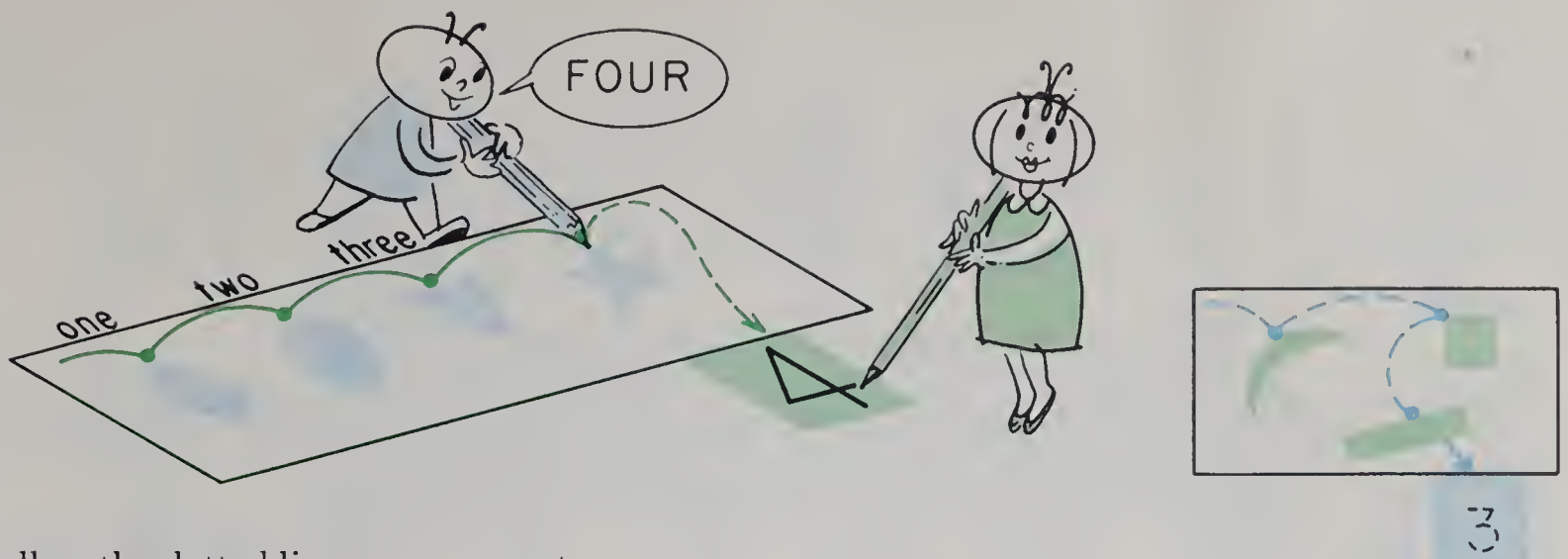
Marvin Levitt
"Numo" Sketches

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Follow the dotted lines as you count.

a.

b.

c.

d.

e.

f.

g.

h.

i.

j.

k.

l.

m.

n.

o. $6 + 4 =$

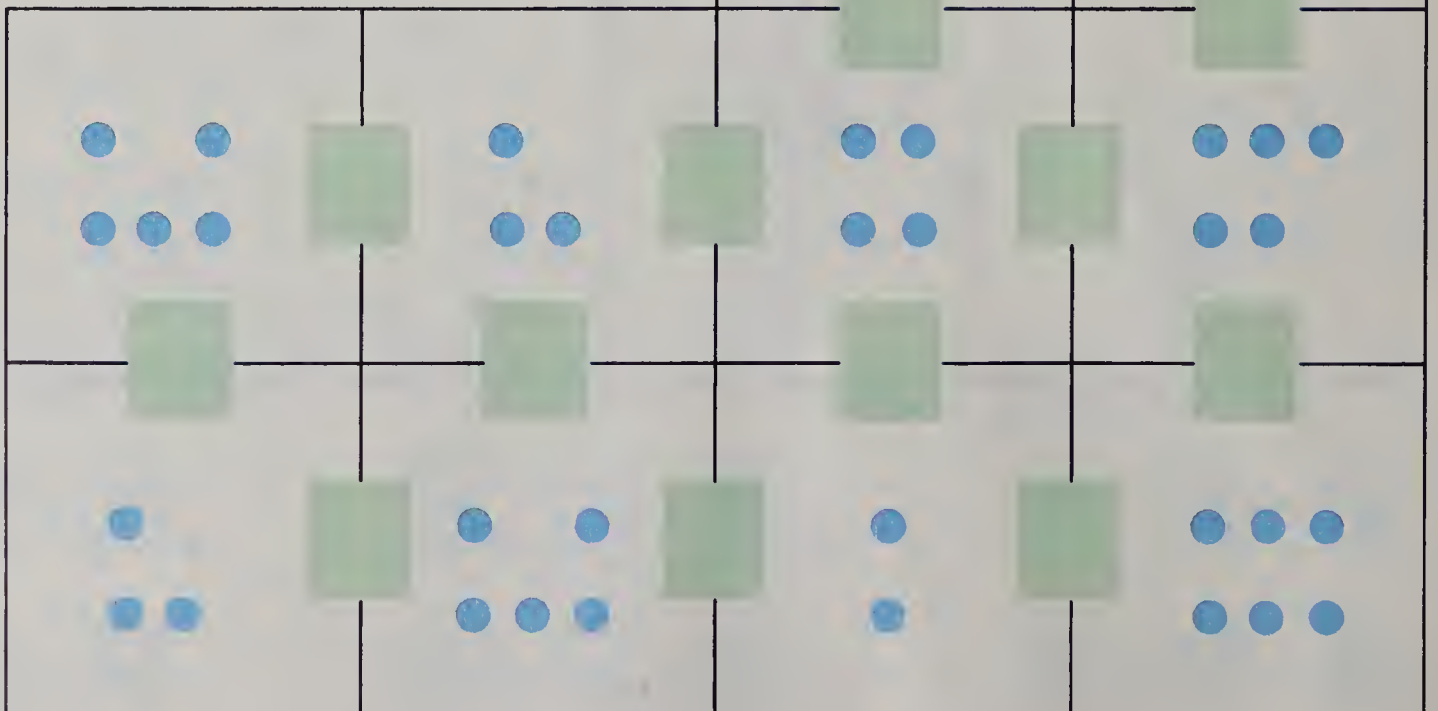
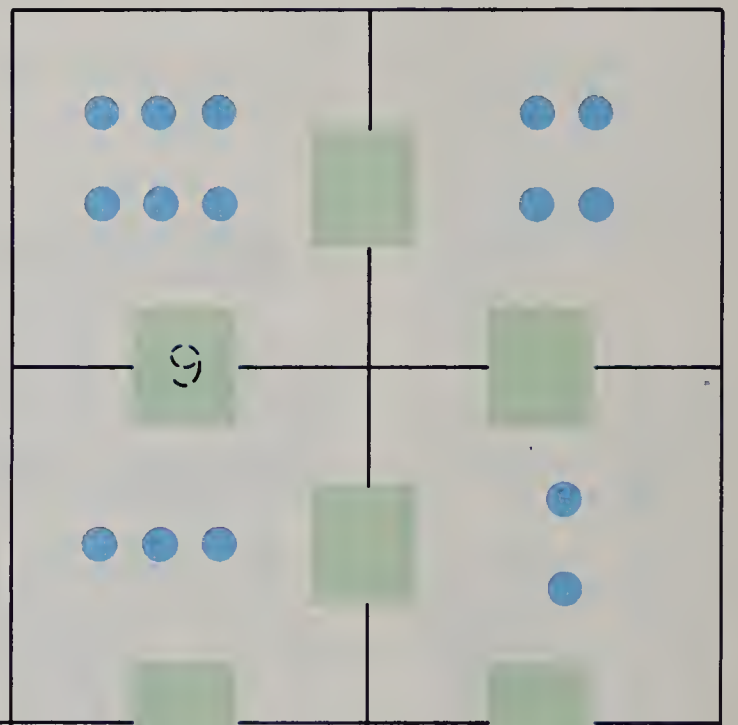
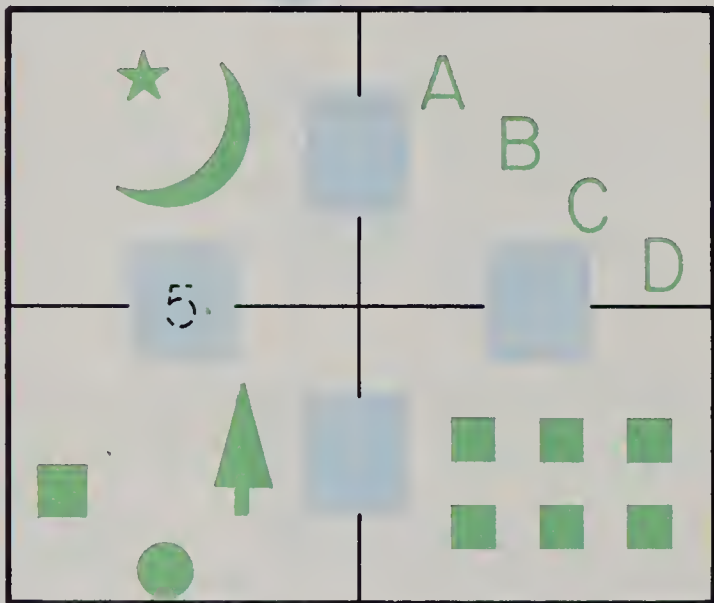
q. $2 + 3 =$

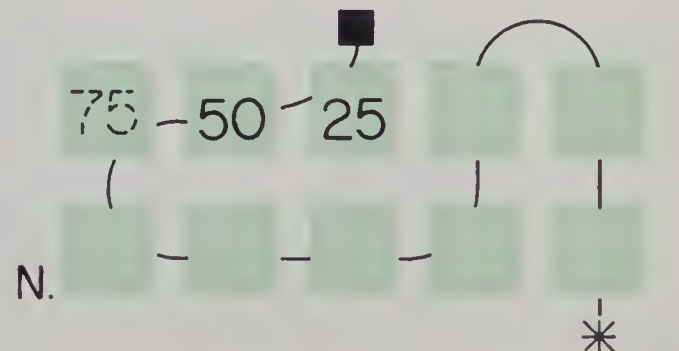
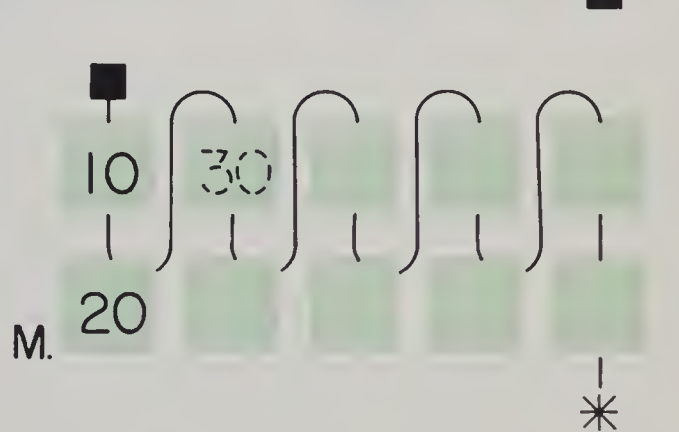
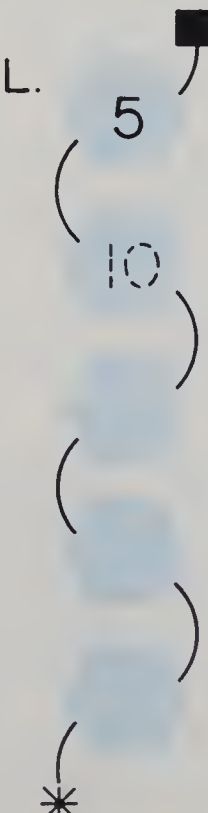
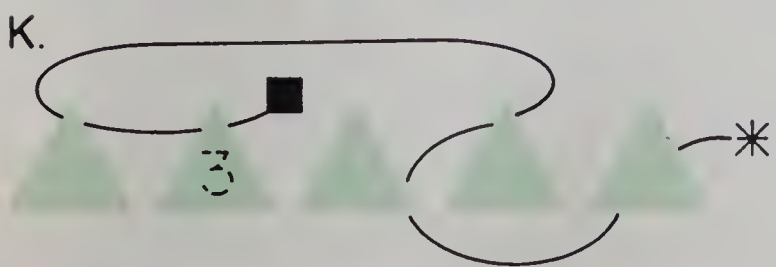
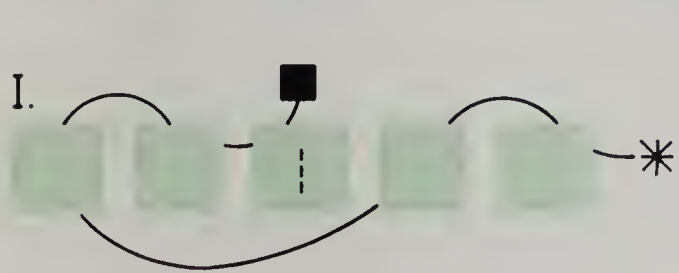
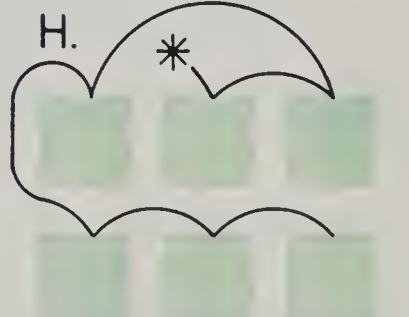
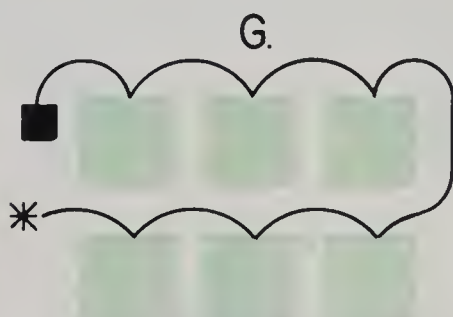
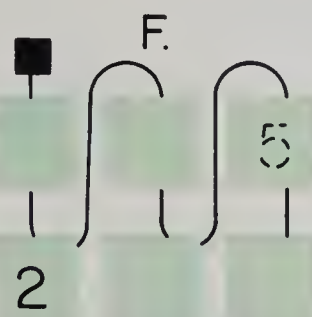
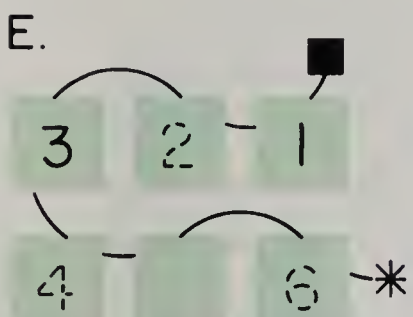
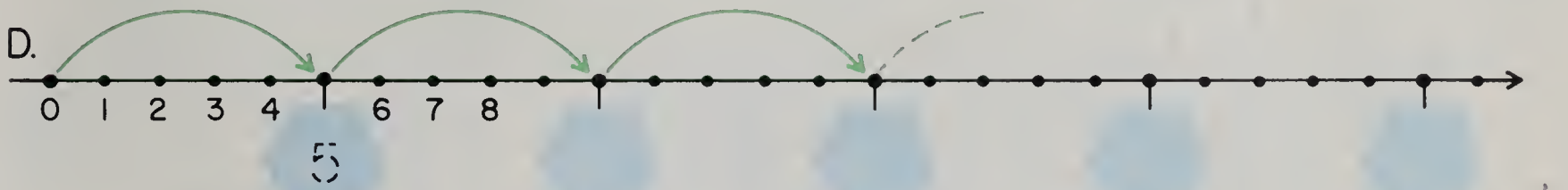
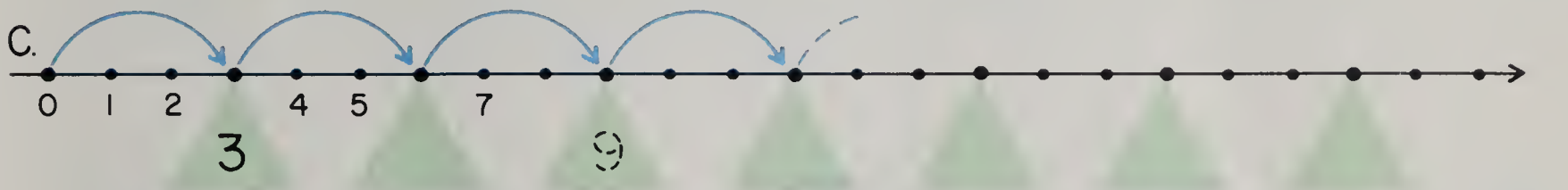
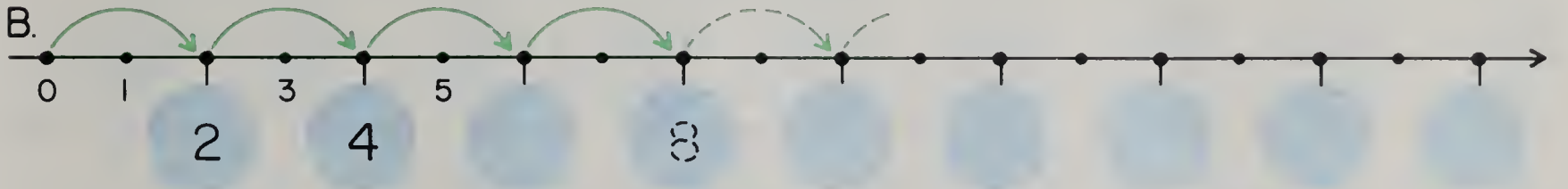
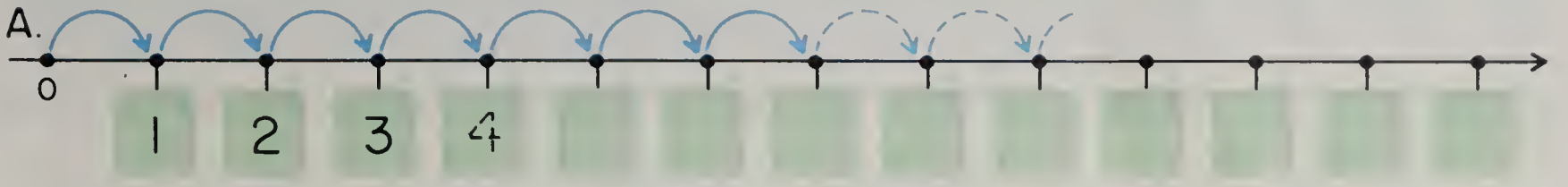
s. $+ 6 = 10$

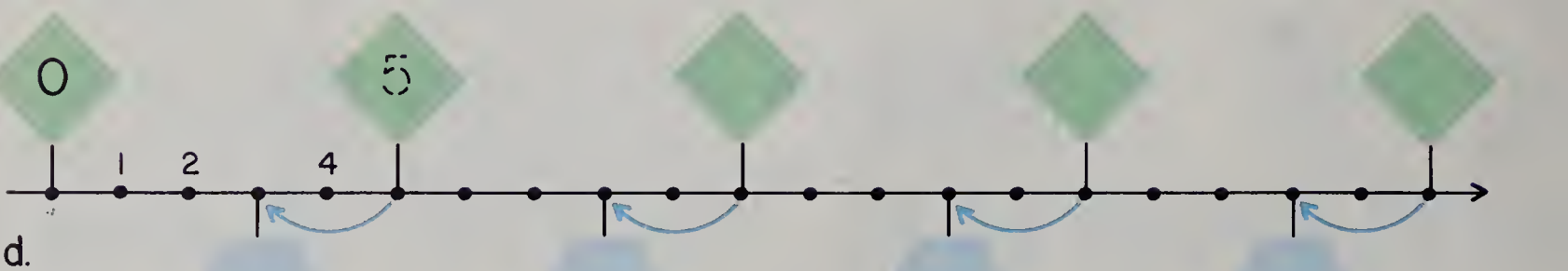
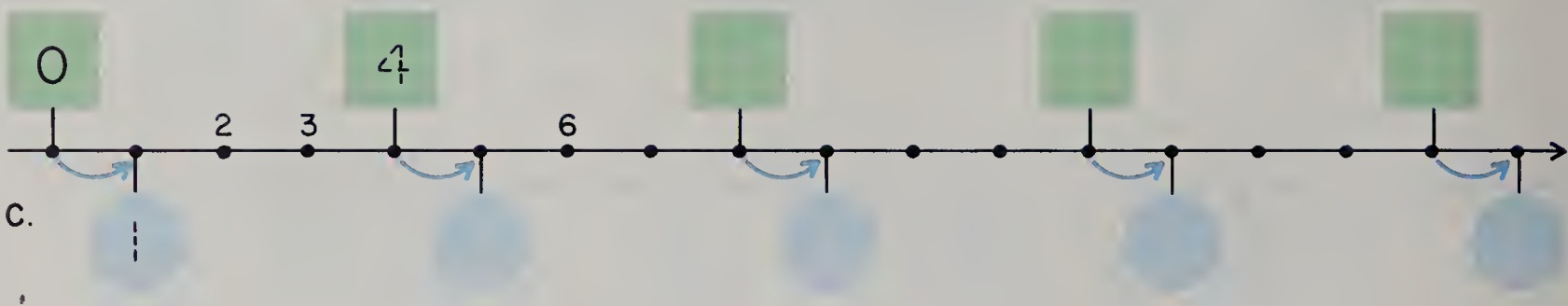
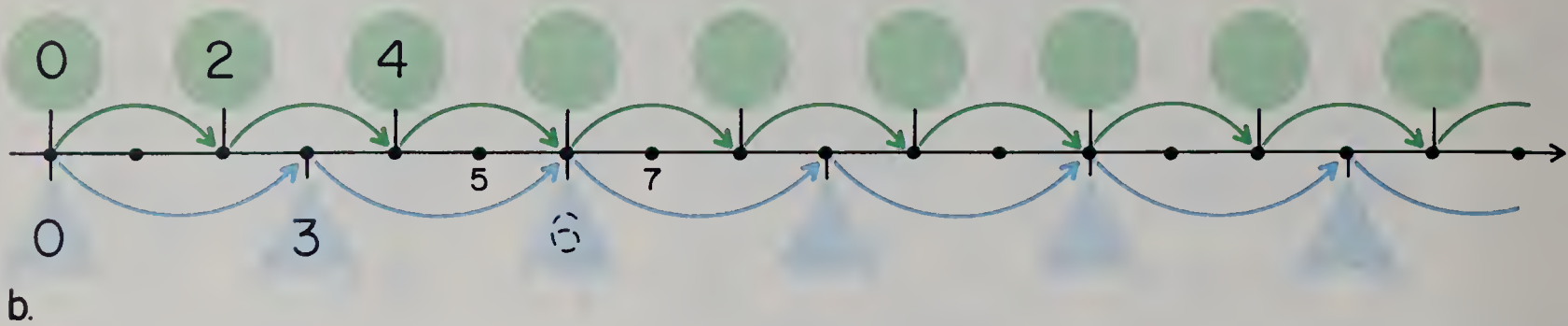
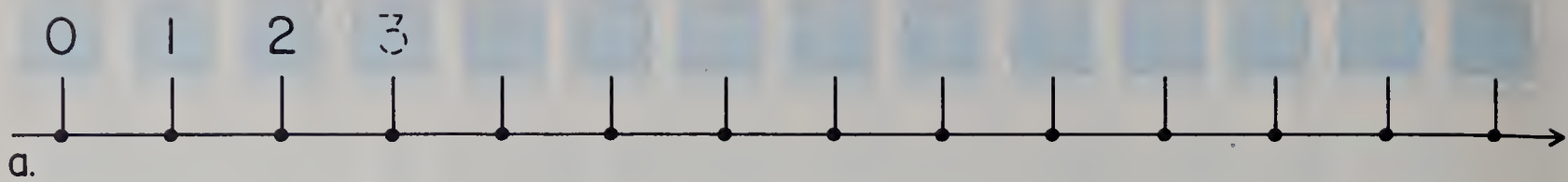
p. $4 + 6 =$

r. $3 + 2 =$

t. $6 + = 10$







e. 0, 2, 4, _____, _____, _____, _____, 14, _____, _____, _____

f. _____, _____, 16, 14, 12, _____, _____, _____, 4, _____, _____

g. _____, _____, 24, _____, _____, _____, 15, _____, _____, 6, 3, _____

h. 0, 5, _____, 15, _____, _____, _____, _____, _____, _____, _____

i. 1, 3, 5, _____, _____, _____, 11, _____, _____, _____, 17, _____, _____

Look for clues that suggest what you are to do.

A

HE IS
~~HERE~~

B

BILL RAN
~~FAST~~

C

EIGHT
HUNDRED
TWELVE

D

LOOK FOR
CLUES
THAT HELP

E

F

	A	B	C	D	E	F
Total number of letters	8				10	15
Letters crossed out	3	5	7		4	7
Letters not crossed out	5	3		15		

What Are My Rules?

I. 26, 24, 22, 20, _____, _____, _____, _____, _____, _____, _____

II. _____, _____, _____, 27, 25, 23, 21, _____, _____, _____, _____, _____

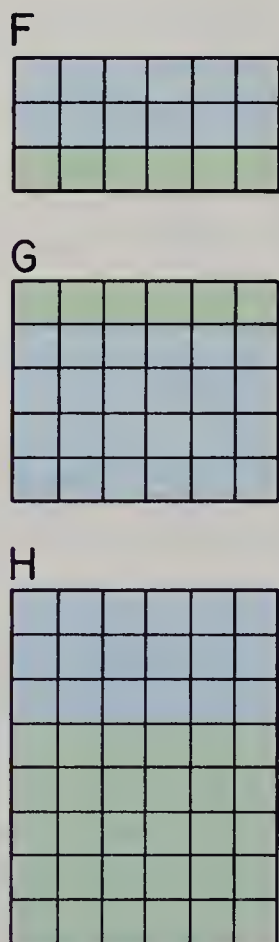
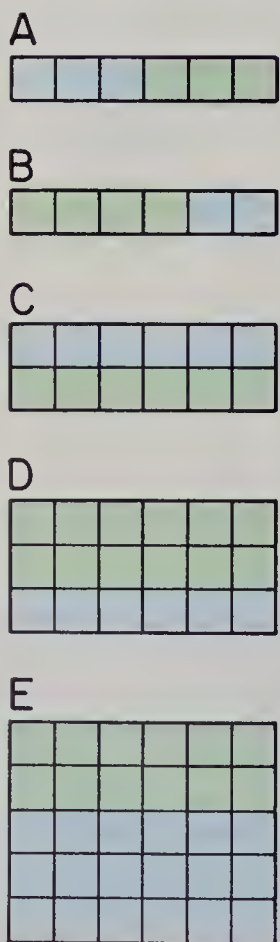
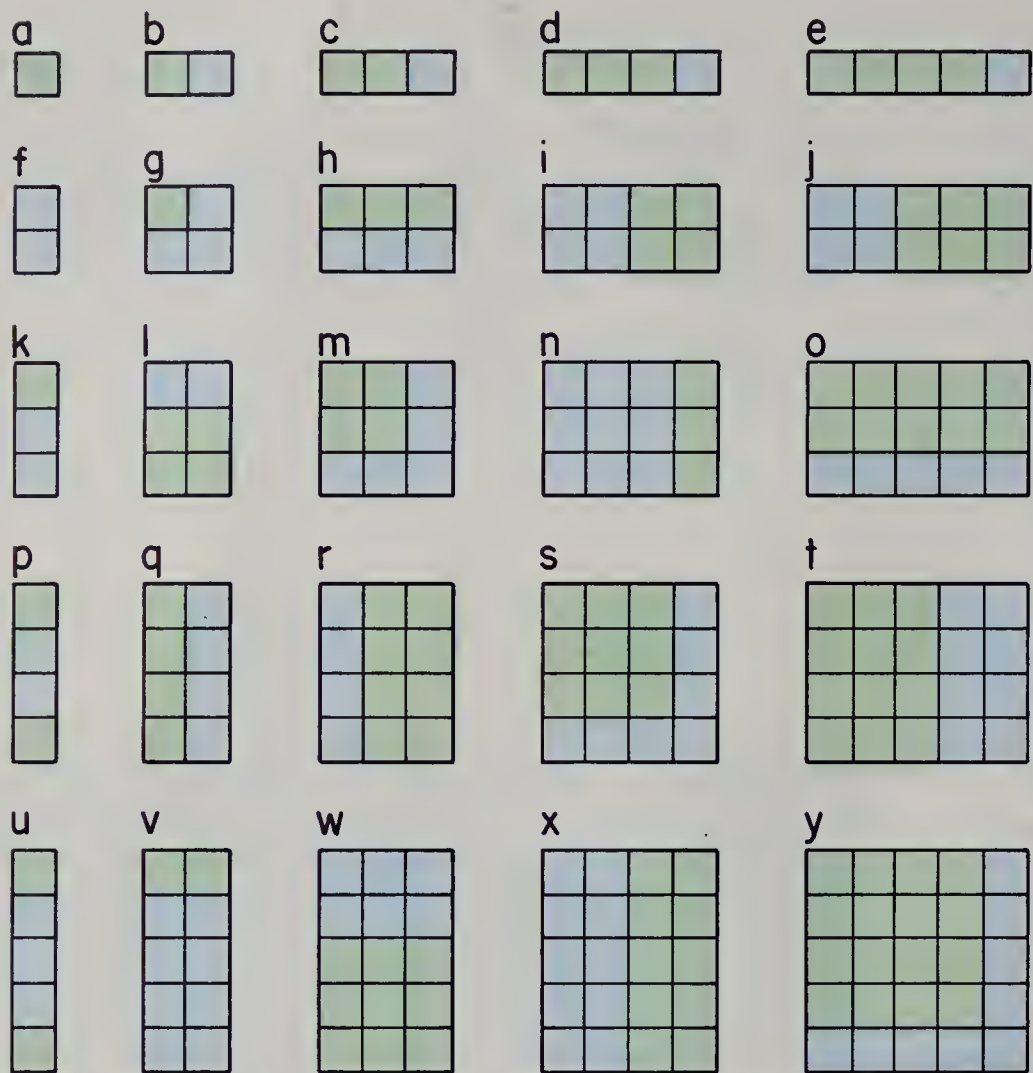
III. _____, _____, _____, _____, 27, 24, 21, _____, _____, _____, _____, _____

IV. _____, _____, 38, 35, _____, _____, 26, 23, _____, _____, _____, _____

V.

9	12	8	11		23		13	20	40	21		d
7	4	3	9	6	3	19	7	10	1		2	e
2		5		1	20	0		10		17	68	d-e

How many tiles are blue? How many tiles are green? How many tiles in all?



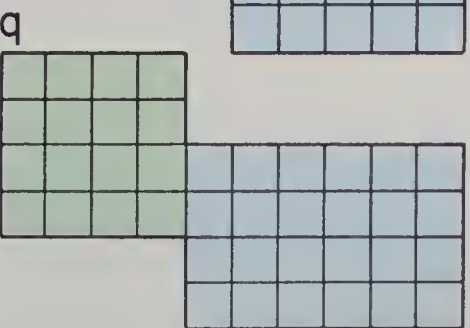
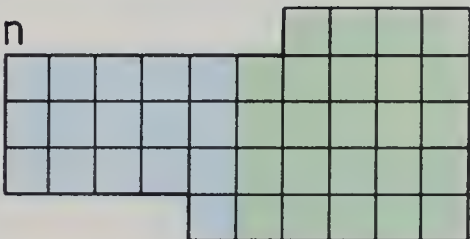
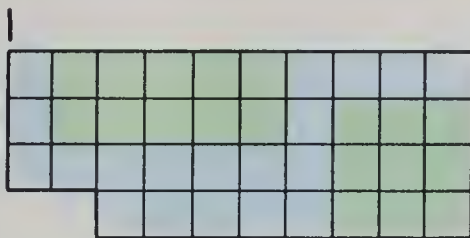
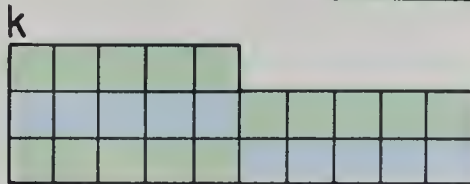
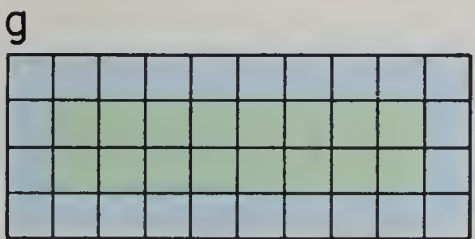
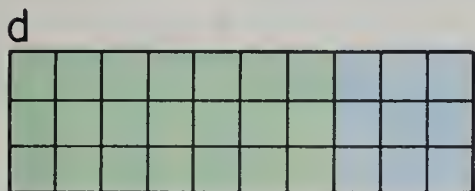
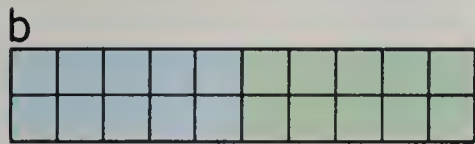
	Blue	Green	Total
x			
y			
A			
B			
C			
D			
E			
F			
G			
H			

	Blue	Green	Total
a			
b			
c			
d			
e			
f			
g			
h			
i			
j			
k			
l			
m			
n			
o			
p			
q			
r			
s			
t			
u			
v			
w			

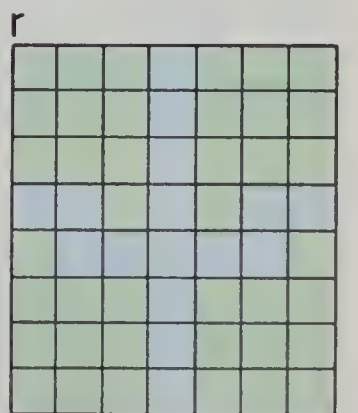
How many tiles are green?

How many tiles are blue?

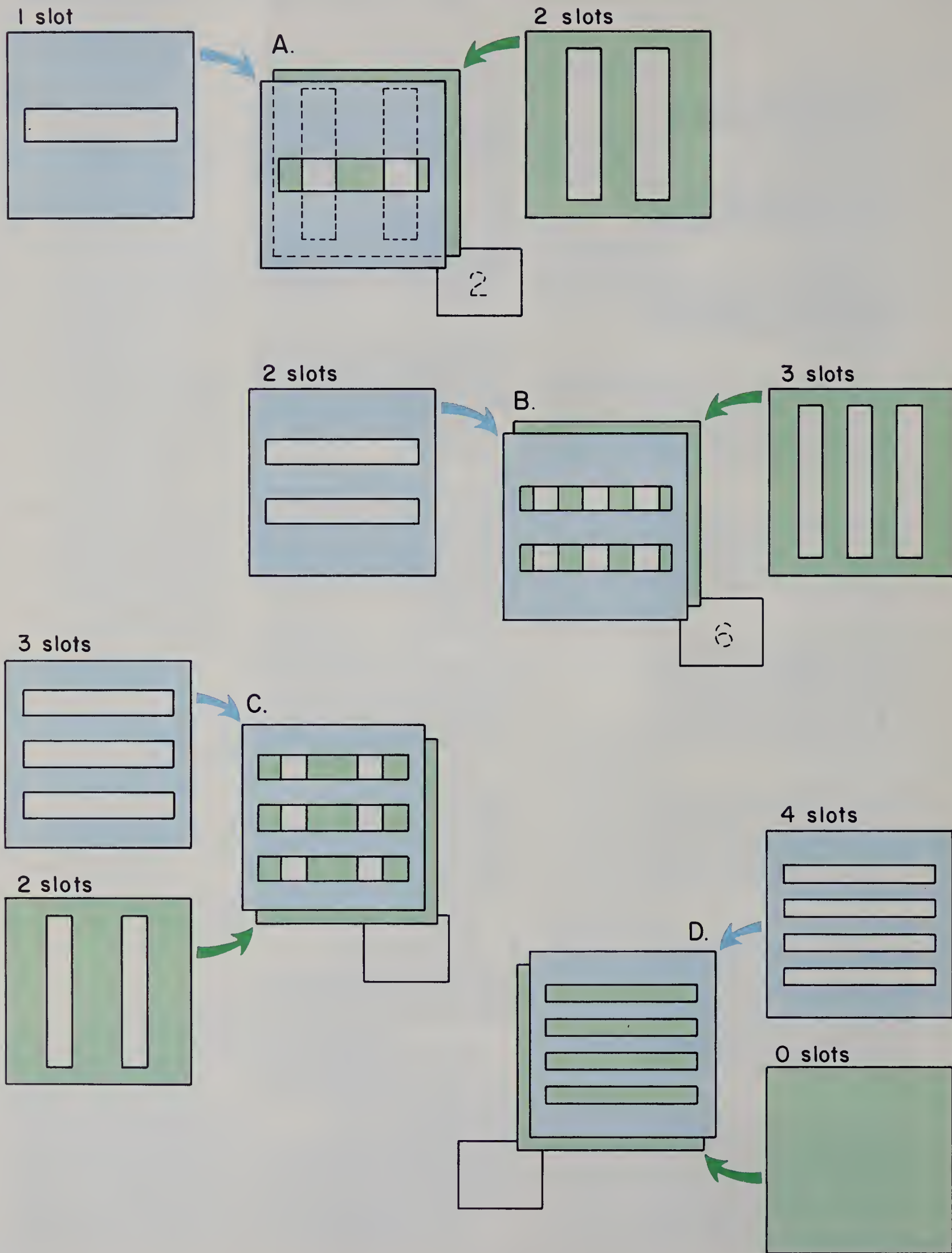
How many tiles in all?



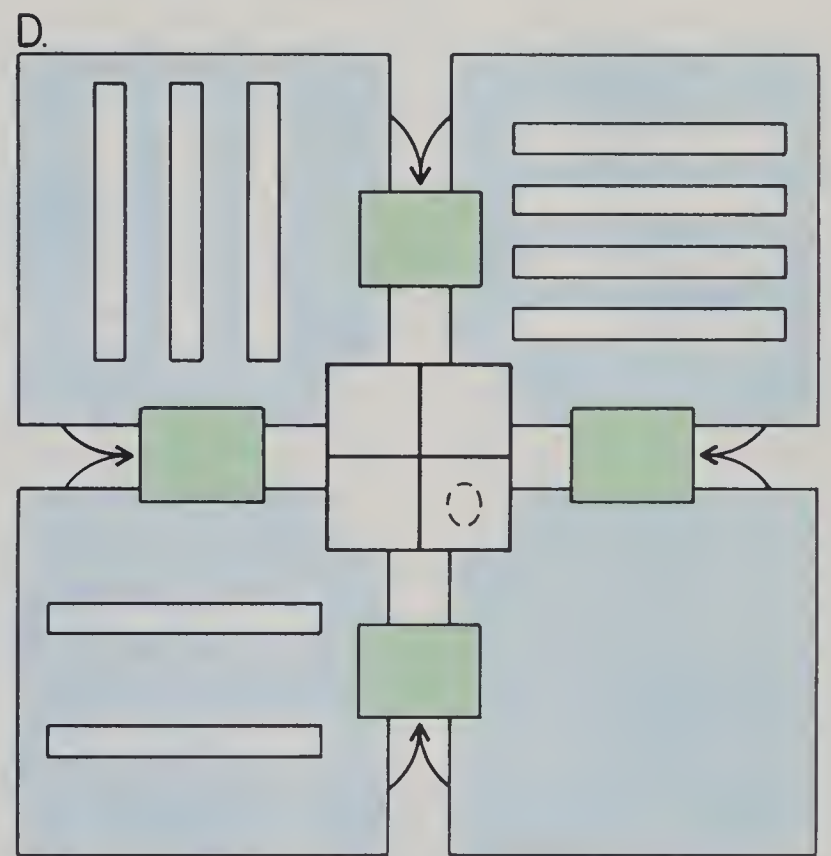
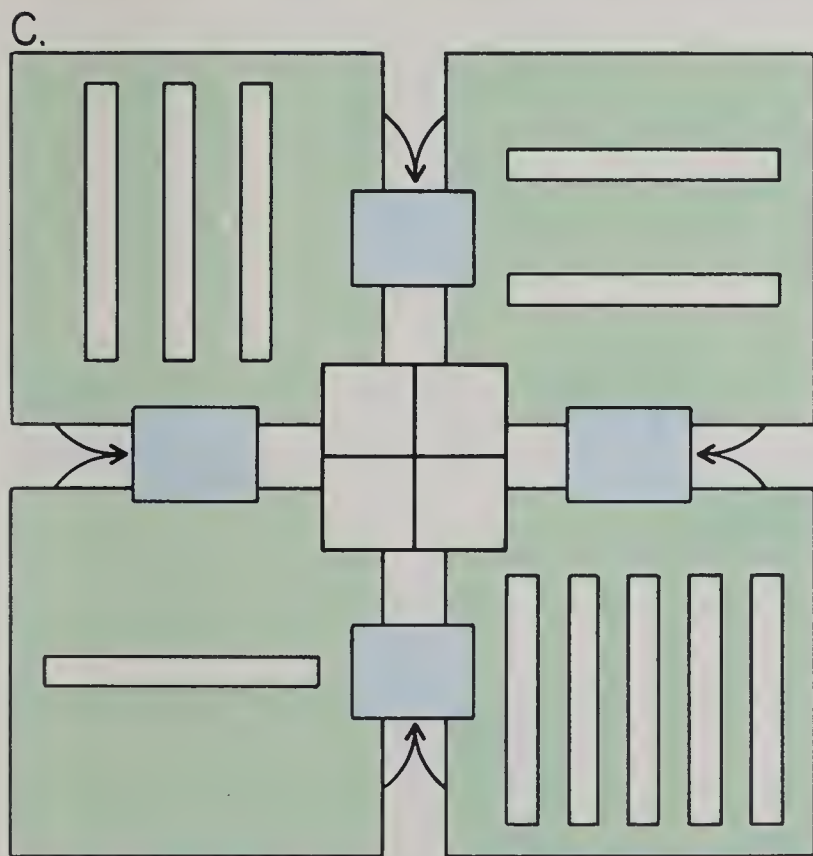
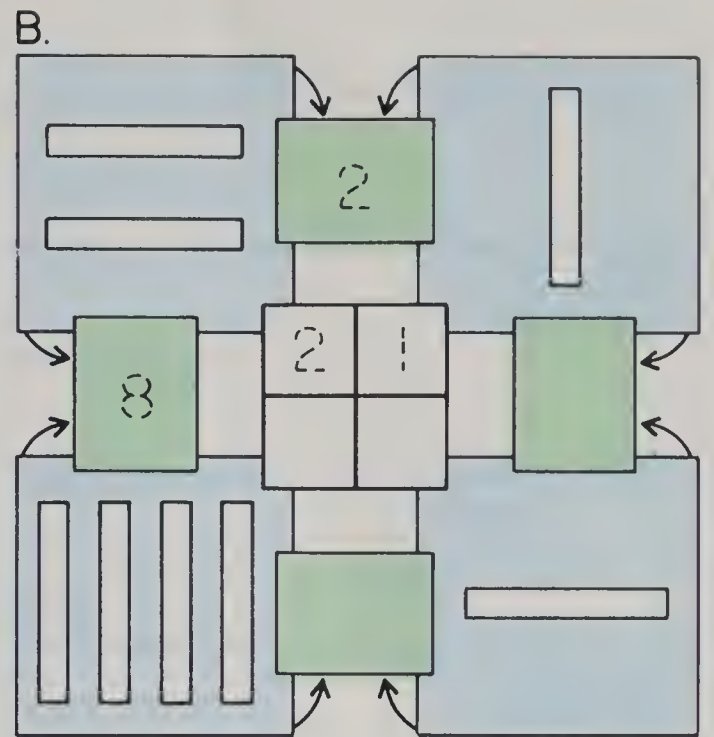
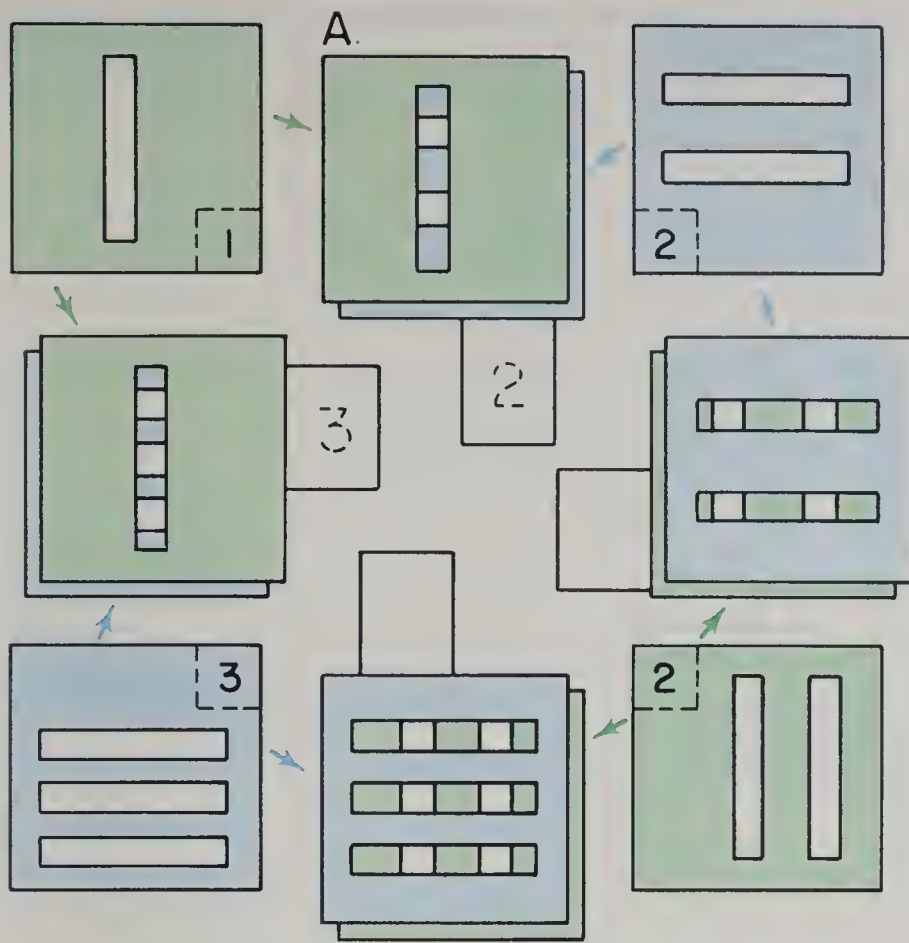
	Green	Blue	Total
a	6	4	10
b	10		
c		8	
d			
e			
f			
g			
h			
i			
j			
k			
l			
m			
n			
o			
p			
q			
r			



Imagine a series of cards — with slots cut in them. Put one on top of the other. In how many places does light show through?



What Are My Rules?



E.

jumps of 3	two jumps	6	three jumps	
	five jumps		ten jumps	

F.

	in three rows		in four rows	
rows of 6	in half a row		in five rows	

Here is some work Numo was doing.
He didn't finish it.

Can you do it for him?

1 line	no crossing points	0	no crossing points	0	2 ways
2 lines	0	0	one crossing point	1	3 ways
3 lines	0	0	two crossing points in each	2	4 ways
4 lines	0	0	3	5 ways	
5 lines	ways				

6 lines	0	5	7
7 lines	7		
8 lines			

lines

lines

Here is more of Numo's work. Can you find the rules he is following? Help him finish his sketches and records.

	$\begin{array}{r l} 2 & 6 \\ \hline & 4 \end{array}$		$\begin{array}{r l} 5 & 6 \\ \hline & 1 \end{array}$		$\begin{array}{r l} 1 & 4 \\ \hline & \end{array}$
	$\begin{array}{r l} 2 & 4 \\ \hline 2 & 8 \end{array}$		$\begin{array}{r l} 5 & 1 \\ \hline & \end{array}$		$\begin{array}{r l} & 3 \\ \hline & \end{array}$
	$\begin{array}{r l} 4 & 3 \\ \hline & \end{array}$		$\begin{array}{r l} 1 & 1 \\ \hline & \end{array}$		$\begin{array}{r l} & 5 \\ \hline & \end{array}$
	$\begin{array}{r l} & 6 \\ \hline & \end{array}$		$\begin{array}{r l} 1 & 1 \\ \hline & \end{array}$		$\begin{array}{r l} & 6 \\ \hline & \end{array}$

Think of 4 things. Call them $a, b, c,$ and d
 . . . so we can talk about them.

Think of 3 other things. Call them $x, y,$
 and $z.$

$$\{a, b, c, d\} \text{ and } \{x, y, z\}$$

Put them together and count them. We find
 7 in all.

When we think this way, we write:

$$4 + 3 = 7$$

We say, "Four plus three equals seven."
 This is an example of **ADDITION**.

We say that seven is the *sum* of four and
 three and that four and three are *addends* of
 seven. But, we might think of the four things
 and the three things in another way.

We could think of making combinations by
 pairing a thing from the first group with a
 thing from the second. We could find all the
 pairs that can be made this way.

$$\{a, b, c, d\} \text{ and } \{x, y, z\}$$

ax bx cx dx
 ay by cy dy
 az bz cz dz

We find 12 pairs in all. When we think this
 way, we write:

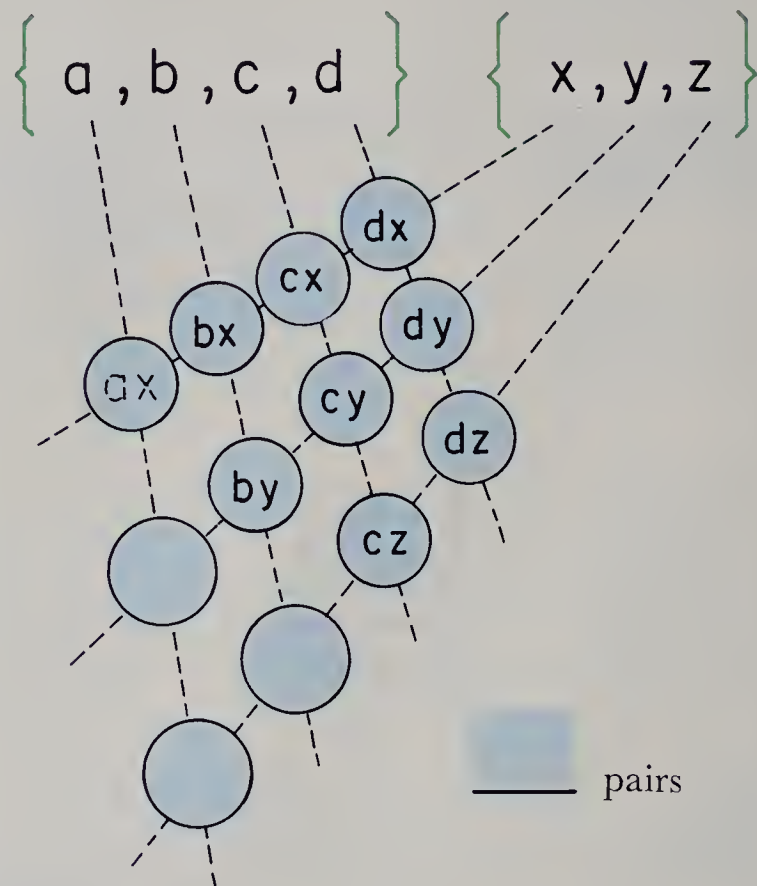
$$4 \times 3 = 12$$

We say, "Four times three equals twelve,

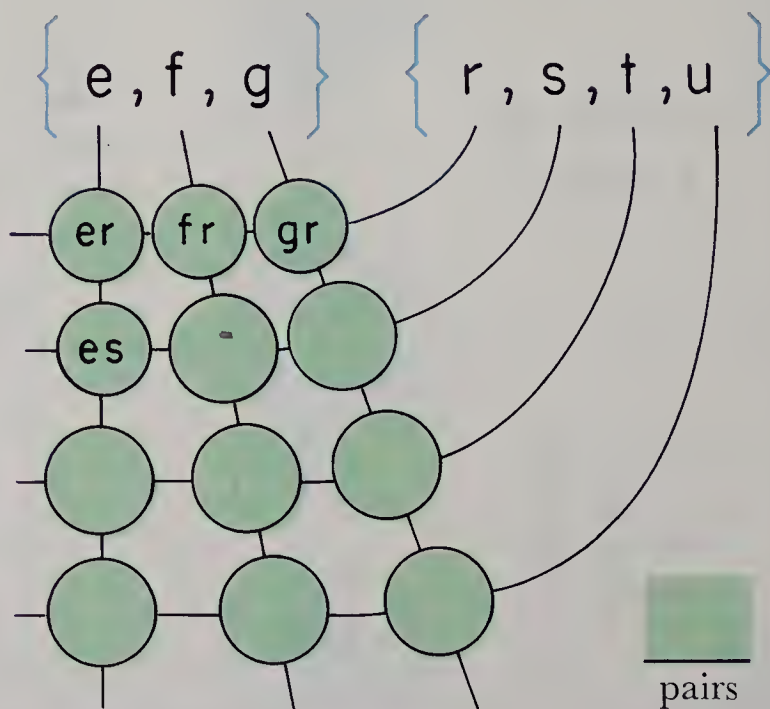
or four multiplied by three equals twelve."
 This is an example of **MULTIPLICATION**.

We say that "twelve is the *product* of four
 and three" and that "four and three are *factors*
 of twelve."

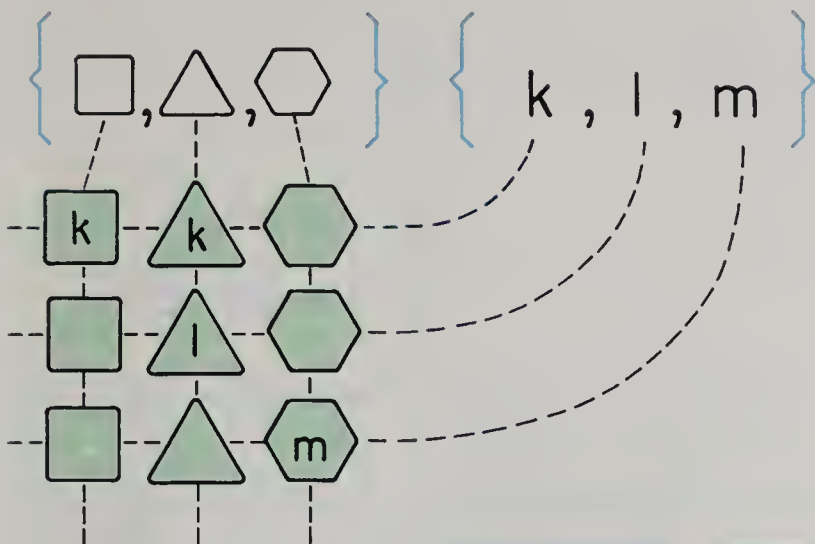
We could have used this drawing to find the
 pairs in the example above:



Suppose that we had had only 3 things in
 the first group and 4 in the other. We would
 have had:

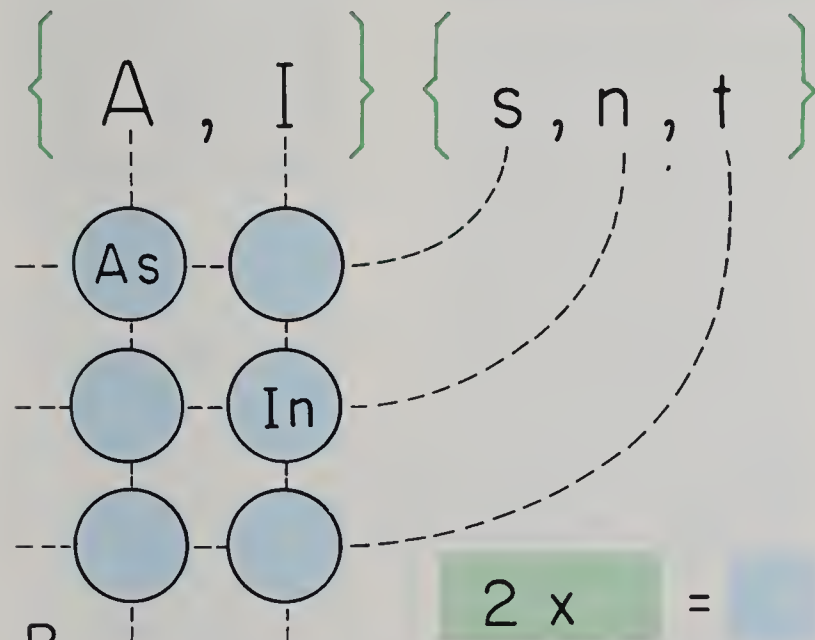


Let's do some more pairing. Remember, each pair of things must get its first thing from the first group and its second thing from the second group.



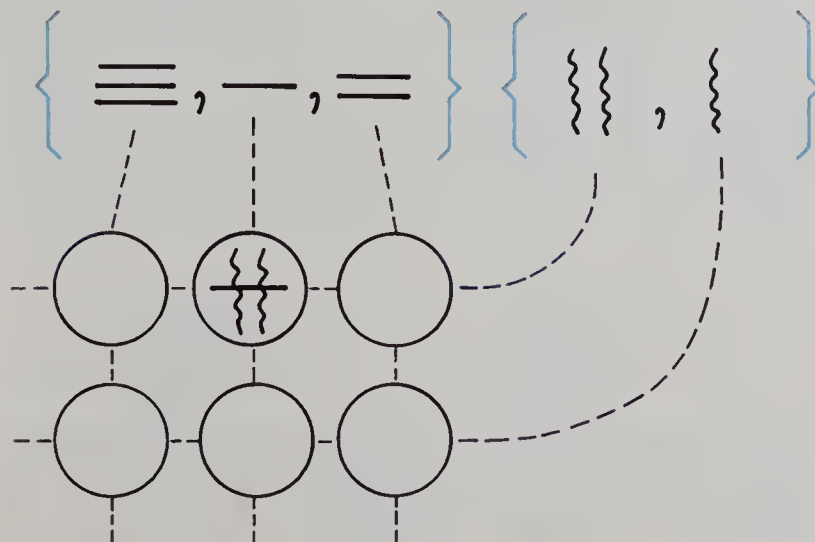
A

$$3 \times 3 = \square$$



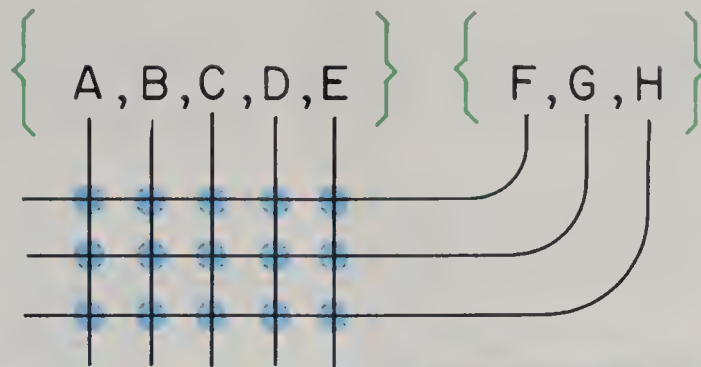
B

$$2 \times \square = \square$$



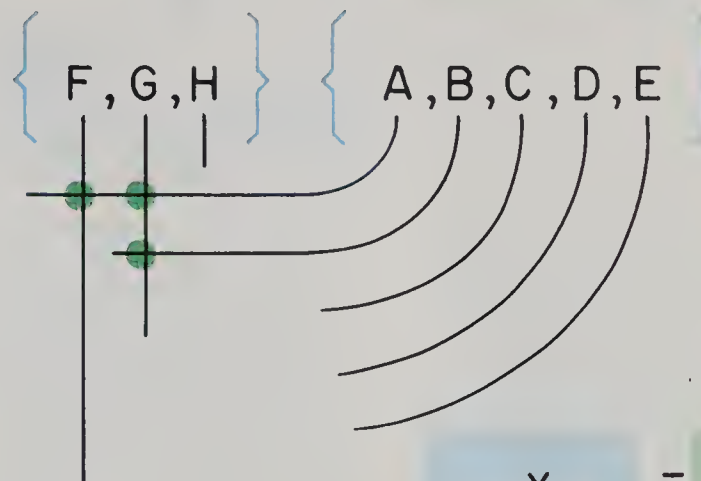
C

$$3 \times \square = \square$$



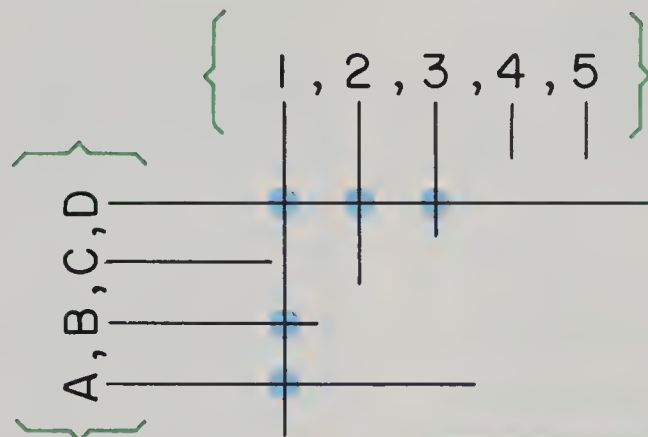
D

$$5 \times \square = \square$$



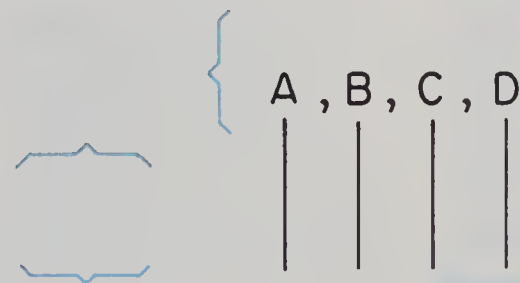
E

$$\square \times \square = \square$$



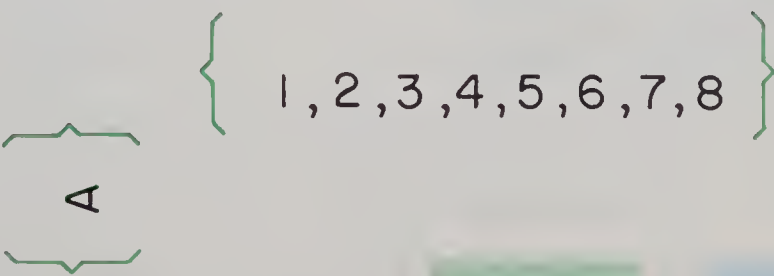
F

$$\square \times \square = \square$$



G

$$0 \times 4 = \square$$



H

$$\square \times \square = \square$$

Imagine pieces of clear plastic with lines drawn on them. Put one on top of another. In how many places do the lines cross?

A.

$2 \times 2 =$

B.

$5 \times 2 =$

C.

$1 \times 3 =$

$3 \times 2 =$

D.

$2 \times 5 =$

$5 \times 3 =$

E.

Bill had some marbles. He had two boxes — one square and one round. He put all the marbles in the two boxes.

What can we say about this situation? Here are two things we might say:

1. If Bill had an even number of marbles, he could have put the same number of marbles in each box.
2. If he had an odd number of marbles, he could not have put the same number in each box.

The records below show some other things we can say about the situation.

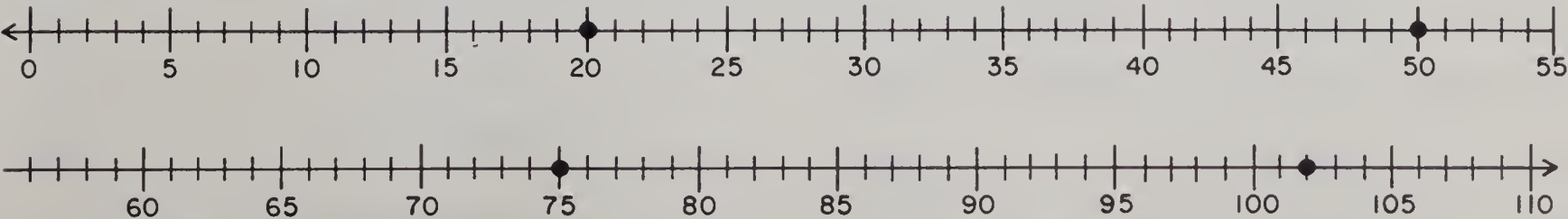
If Bill had 20 marbles	
and if he put ----- in the square box	then he put ----- in the round box
15	5
5	
10	
1	
3	
0	
	18
	6
4	
	7

If Bill had 50 marbles	
and he put ----- in the square box	then he put ----- in the round box
10	
20	
	25
	48
	9
45	
12	
	29
17	
	13

If Bill had 75 marbles	
and he put ----- in the square box	then he put ----- in the round box
70	
10	
45	
	25
31	
6	
	8
	59
35	
	38

If Bill had 102 marbles	
and if he put ----- in the square box	then he put ----- in the round box
100	
3	
	97
10	
20	
	52
62	
9	
	13
47	

You may wish to use the two number line chunks below to check some of your results.



How many 2-digit numbers are there with
the tens digit from the green box
and

the units digit from the blue box?

A

4, 7	0
------	---

4 0 7 0

2 numbers

B

8	9, 5
---	------

_____ numbers

C

6	
---	--

_____ numbers

D

4, 5	0, 1, 2, 3
------	------------

_____ numbers

E

1, 9, 6, 7	3, 8
------------	------

_____ numbers

F

1, 2, 3	1, 2, 3
---------	---------

_____ numbers

G

9, 7	1, 2, 3, 4, 5
------	---------------

_____ numbers

H

1, 2, 3, 4, 5	9, 7
---------------	------

_____ numbers

I

1, 2, 3	1, 2, 3, 4
---------	------------

_____ numbers

J

Alice had 4 blouses: pink, orange, white, and brown. She had 3 skirts: black, purple, and blue. How many blouse-skirt combinations does she have?

pink	blouse with	black	skirt
pink	blouse with	purple	skirt
orange	blouse with	black	skirt
_____	blouse with	_____	skirt
_____	blouse with	_____	skirt

_____	blouse with	_____	skirt
_____	blouse with	_____	skirt
_____	blouse with	_____	skirt
_____	blouse with	_____	skirt
_____	blouse with	_____	skirt
_____	different combinations		

How many 2-letter words are there with the first letter from one list and the second letter

from the other? Find as many different pairs as you can.

I.

M

e, y

Me

My

X

2 words

II.

S, W

X

X

X

0 words

III.

H, B

e

 words

IV.

T, D, S, N

o

To

 words

V.

A

m, n, s, t

 words

VI.

B, M

y, e

 words

VII.

I

f, t, n

 words

VIII.

O, I

n, f

 words

IX.

A, I

s, n, t

 words

X.

One Sandwich Per Person

HAMBURGER

HOT DOG

or FISH

FREE

with Onions, Catsup, Mustard, or Nothing.

How many combinations?

with

with

with

with

with

with

with

with

Hamburger

with

mustard

Fish

with

nothing

Fish

with

onions

with

There are possible combinations.

Each line of the table fits one of the sketches. Write the letter of a sketch on the line which fits the sketch.

Sketch	Number of lines	Number of crossing points
D	8	15
A	5	6
	4	4
	5	0
	6	9
	10	24
		7
	14	24
	9	14
	10	16
	8	16
	9	20
	11	30
	12	20
	7	12
	8	12
		19
	10	21
		11
	11	18
	7	0
	9	18

B

C

D

E

A

F

G

H

I

J

K

L

M

N

O

P

Q

R

S

T

U

V

Mary had 23¢. She spent more than 15¢.
What can you say about this situation?

We can say that if she spent 23¢ then she had 0¢ left;
if she spent 22¢ then she had 1¢ left;
if she spent 21¢ then she had _____¢ left; etc.

We can make a chart to show many of the possibilities:

If she spent _____¢	23	22	21	20	19		17						
then she had _____¢ left.	0					5		7					

Comment: There are _____ different amounts Mary could spend in the situation given.

Bill had a dime bank with 4 dimes in it.
He received some dimes for his birthday.
He put all the dimes he received into his bank. What can you say?

We can say that if he received 1 dime then he had 50¢ in his bank;
if he received 3 dimes then he had _____¢ in his bank;
if he received _____ dimes then he had 40¢ in his bank; etc.

Below we can keep a record. In it we can record the results of many of the possibilities.

If Bill received _____ dimes	1	3	0	2	5	4	6	8	7	9	
then he had _____¢ in his bank.											

Comment: Did we consider all of the amounts that Bill might have received?

Count the tiles and record your results.

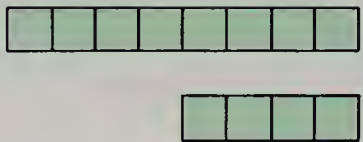
A.

$$13 + 5 = 18$$



B.

$$8 + 4 = \square$$



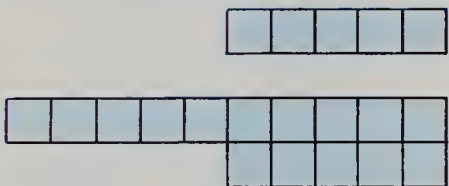
C.

$$14 + \square = \square$$



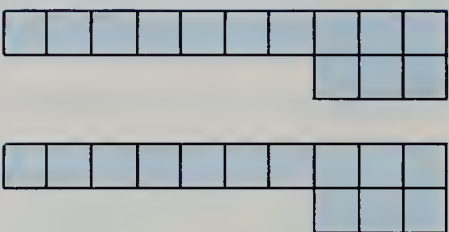
D.

$$\square + \square = \square$$



E.

$$\square + \square = \square$$



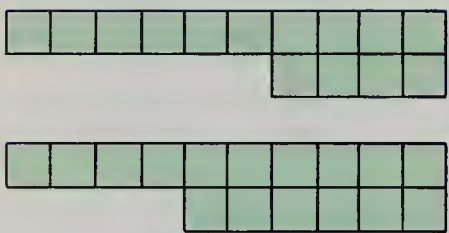
F.

$$\square + \square = \square$$



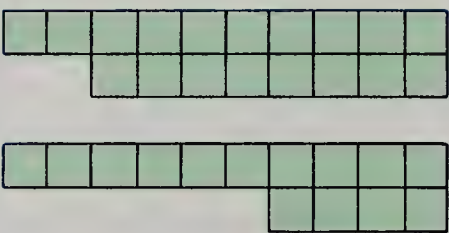
G.

$$\square + \square = \square$$



H.

$$\square + \square = \square$$



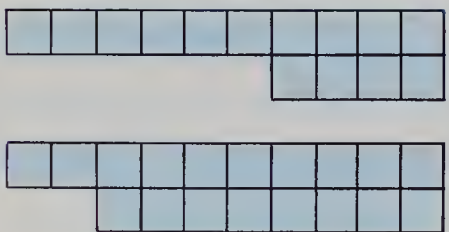
I.

$$\square + \square = \square$$



J.

$$\square + \square = \square$$



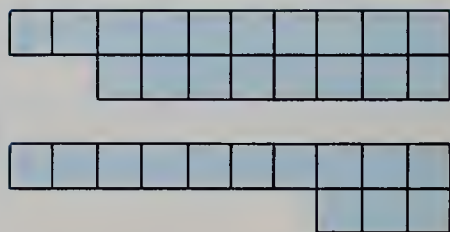
K.

$$\square + \square = \square$$



L.

$$\square + \square = \square$$



M. What's My Rule?

5	7	13	9	18	27				99	C
8	10	16				41	58	82		C + 3

N.

$$16 + 14 = \square$$



$$\begin{array}{r} (10 + 6) \quad 16 \\ + (10 + 4) \quad 14 \\ \hline (20 + 10) \end{array}$$

O.

$$13 + \square = \square$$



$$\begin{array}{r} (10 + 3) \quad \square \\ + (0 + \square) \quad \square \\ \hline (\square + \square) \end{array}$$

P.

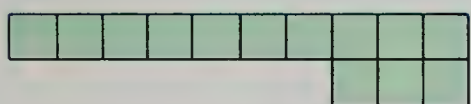
$$\square + \square = \square$$



$$\begin{array}{r} (7 + \square) \quad \square \\ + (\square + 10) \quad \square \\ \hline (12 + \square) \end{array}$$

Q.

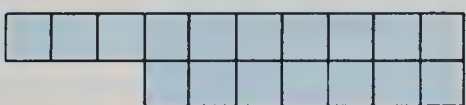
$$\square + \square = \square$$



$$\begin{array}{r} (\square + 3) \quad \square \\ + (20 + \square) \quad \square \\ \hline (\square + \square) \end{array}$$

R.

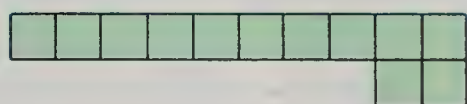
$$\square + \square = \square$$



$$\begin{array}{r} (20 + \square) \quad \square \\ + (10 + \square) \quad \square \\ \hline (\square + \square) \end{array}$$

S.

$$\square + \square = \square$$



$$\begin{array}{r} (\square + 2) \quad \square \\ + (\square + 7) \quad \square \\ \hline (\square + \square) \end{array}$$

What Are My Rules?

T.

3	7	→ 10
9	1	→
↓	↓	↓
	8	→

U.

12	4	→
7	3	→
↓	↓	↓
		→

V.

10	9	→
10	7	→
↓	↓	↓
		→

W.

4	20	0	10		49		13		100	S
11	27			19		57		92		S + 7

20

- 7

(1) (2) (3) (4)

23 13 27 3

Mark correct
answer.Mark the furthest
from the correct answer.
 Difference between the
answers you marked.

14

1

$$29 + \square = 32$$

 (1) (2) (3) (4)
☐ 13 ☐ 4 ☐ 3 ☐ 61

 1 2 3 4
☐ ☐ ☐ ☐

2

$$\triangle - 8 = 23$$

 (1) (2) (3) (4)
☐ 31 ☐ 40 ☐ 35 ☐ 15

 1 2 3 4
☐ ☐ ☐ ☐

3

$$\begin{array}{r} 12 \\ 6 \\ + 17 \\ \hline \end{array}$$

 (1) 25
 (2) 47
 (3) 8
 (4) 35

 1 2 3 4
☐ ☐ ☐ ☐

4

$$\begin{array}{r} 125 \\ - 18 \\ \hline \end{array}$$

 (1) 107
 (2) 143
 (3) 117
 (4) 133

 1 2 3 4
☐ ☐ ☐ ☐

5

$$\begin{array}{r} 9 \\ 9 \\ 9 \\ 9 \\ + 9 \\ \hline \end{array}$$

 (1) 36
 (2) 59
 (3) 45
 (4) 70

 1 2 3 4
☐ ☐ ☐ ☐

6

$$50 - 18 = \square$$

 (1) (2) (3) (4)
☐ 68 ☐ 42 ☐ 38 ☐ 32

 1 2 3 4
☐ ☐ ☐ ☐

Cheese Sandwiches 12¢ ea.
 Hot Dogs 15¢ ea.
 Fish 20¢ ea.
 Hamburgers 17¢ ea.

Corned Beef 30¢
 Milk 8¢
 Carton

 Bill bought
 2 hamburgers.

 Mary
 bought two
 cheese sandwiches
 and a carton of milk.

7

What did they cost him?

 (1) 24¢ (3) 43¢
 (2) 34¢ (4) 30¢

 1 2 3 4
☐ ☐ ☐ ☐

8

 Alice bought a hot dog, a
 hamburger, and a carton of
 milk. How much did she
 spend?

 (1) 32¢ (2) 30¢
 (2) 18¢ (4) 40¢

 1 2 3 4
☐ ☐ ☐ ☐

9

 (1) 32¢ (3) 28¢
 (2) 20¢ (4) 18¢

 1 2 3 4
☐ ☐ ☐ ☐

10

 Mark had one dollar. He
 bought as many corned beef
 sandwiches as he could. How
 much change did he get?

 (1) 20¢ (3) 1¢
 (2) 10¢ (4) 29¢

 1 2 3 4
☐ ☐ ☐ ☐

11

 Harry bought 2 fish sand-
 wiches and a carton of milk.
 How much more did Sam
 spend for 2 corned beef
 sandwiches?

 (1) 48¢ (3) 60¢
 (2) 12¢ (4) 8¢

 1 2 3 4
☐ ☐ ☐ ☐

12

 Together Al and Ed
 bought 5 sandwiches, one of
 each kind. They bought 2
 cartons of milk. How much
 did they spend?

 (1) \$1.02 (3) \$1.10
 (2) 98¢ (4) \$1.21

 1 2 3 4
☐ ☐ ☐ ☐



2 is the digit in the units place.

52

Write only the digit that will be in the units place of the sum.

	A	B	C	D	E
	$\begin{array}{r} 11 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 18 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 18 \\ + 1 \\ \hline \end{array}$	$\begin{array}{r} 16 \\ + 14 \\ \hline \end{array}$
I	5	0	2		

	$\begin{array}{r} 13 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 16 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 18 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ + 19 \\ \hline \end{array}$
II					

	$\begin{array}{r} 17 \\ + 29 \\ \hline \end{array}$	$\begin{array}{r} 33 \\ + 24 \\ \hline \end{array}$	$\begin{array}{r} 29 \\ + 39 \\ \hline \end{array}$	$\begin{array}{r} 50 \\ + 39 \\ \hline \end{array}$	$\begin{array}{r} 48 \\ + 49 \\ \hline \end{array}$
III					

5 is the digit in the tens place.

52

Write only the digit that will be in the tens place of the sum.

	F	G	H	I	J
	$\begin{array}{r} 11 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 18 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 18 \\ + 1 \\ \hline \end{array}$	$\begin{array}{r} 16 \\ + 14 \\ \hline \end{array}$
	1	2	2		

	$\begin{array}{r} 13 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 16 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 18 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ + 19 \\ \hline \end{array}$

	$\begin{array}{r} 17 \\ + 29 \\ \hline \end{array}$	$\begin{array}{r} 33 \\ + 24 \\ \hline \end{array}$	$\begin{array}{r} 29 \\ + 39 \\ \hline \end{array}$	$\begin{array}{r} 50 \\ + 39 \\ \hline \end{array}$	$\begin{array}{r} 48 \\ + 49 \\ \hline \end{array}$

Find the sums.

	K	L	M	N	O
	$\begin{array}{r} 11 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 18 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 18 \\ + 1 \\ \hline \end{array}$	$\begin{array}{r} 16 \\ + 14 \\ \hline \end{array}$
IV	15	20	22		
	$\begin{array}{r} 13 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 16 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 18 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ + 19 \\ \hline \end{array}$
V					
	$\begin{array}{r} 17 \\ + 29 \\ \hline \end{array}$	$\begin{array}{r} 33 \\ + 24 \\ \hline \end{array}$	$\begin{array}{r} 29 \\ + 39 \\ \hline \end{array}$	$\begin{array}{r} 50 \\ + 39 \\ \hline \end{array}$	$\begin{array}{r} 48 \\ + 49 \\ \hline \end{array}$
VI					

What Are My Rules?

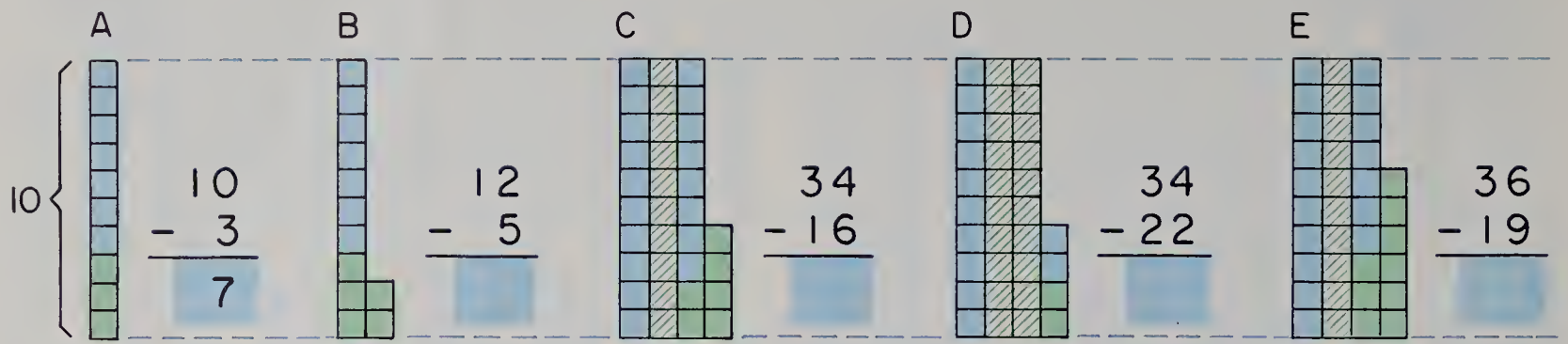
I.

5	5	10
1	6	7
14	0	14
6	3	
7	8	
9		20
	20	30
13		27
	$\frac{1}{2}$	1

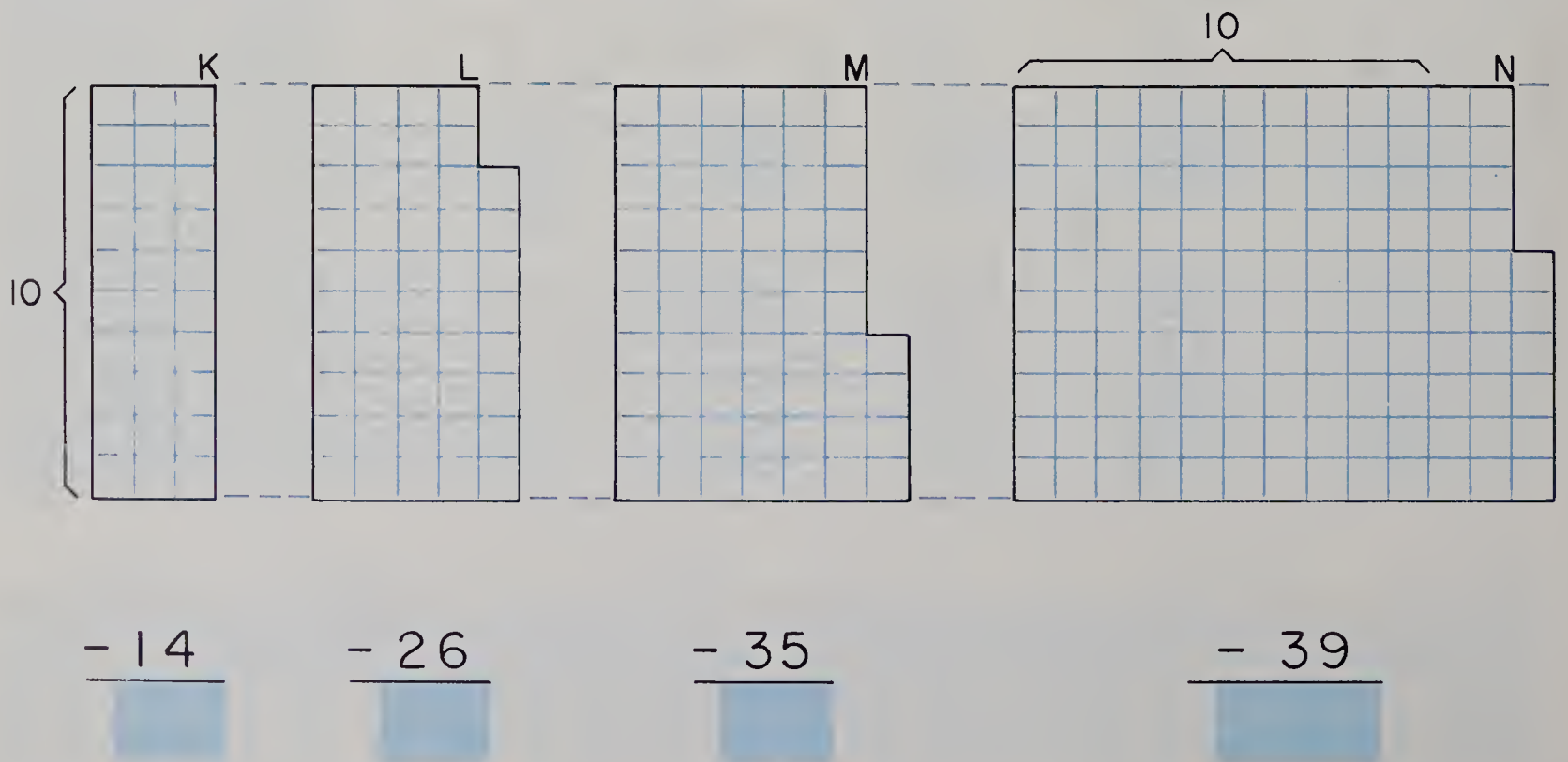
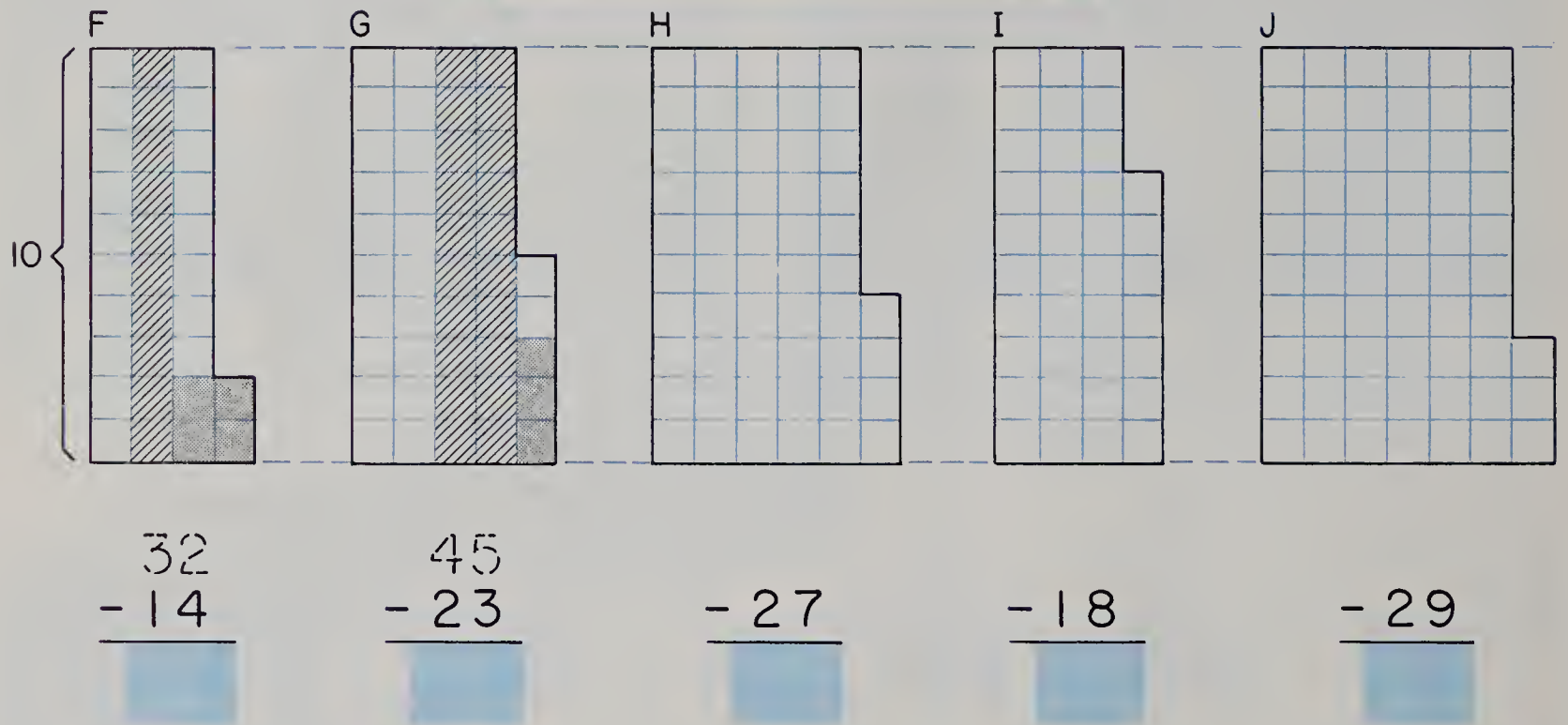
II.

5	9	14	12	20	31				21		100		y
2	6	11				16	27	0		43		200	y - 3

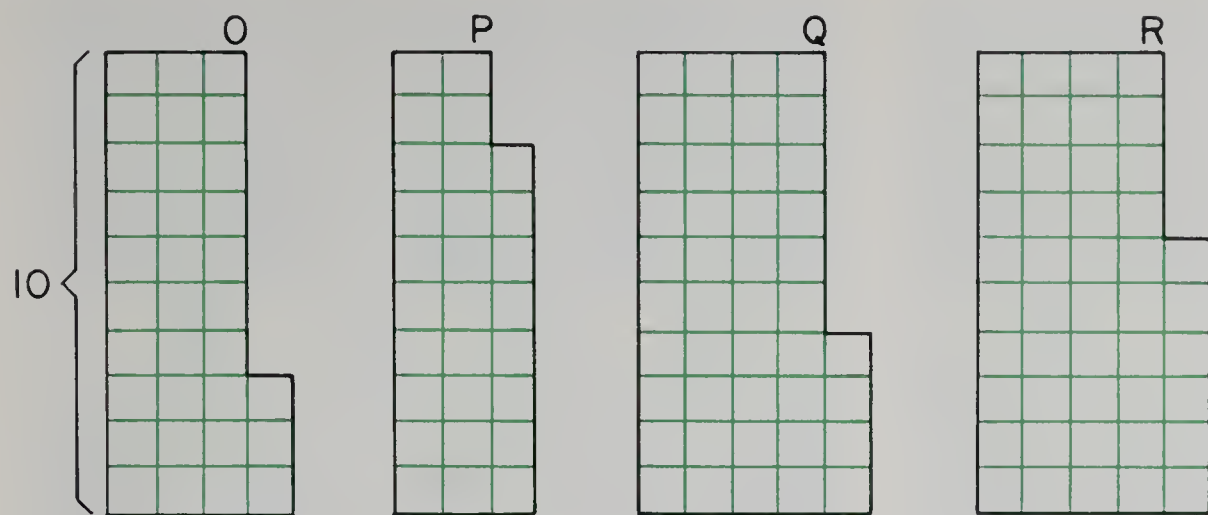
These pictures suggest the idea of subtraction. Please study them.



Complete the sketches below.
Are enough clues given?



This page is very much like the last one. Please complete the sketches.



$$\begin{array}{r} 33 \\ - 8 \\ \hline \end{array}$$

$$\begin{array}{r} 30 \\ - 14 \\ \hline \end{array}$$

$$\begin{array}{r} 30 \\ - 27 \\ \hline \end{array}$$

$$\begin{array}{r} 30 \\ - 19 \\ \hline \end{array}$$

Complete the following subtraction problems. Draw sketches if you need to.

$$\begin{array}{r} \text{(a)} \ 23 \\ - 8 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(b)} \ 30 \\ - 14 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(c)} \ 57 \\ - 30 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(d)} \ 70 \\ - 9 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(e)} \ 90 \\ - 20 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(f)} \ 35 \\ - 15 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(g)} \ 26 \\ - 12 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(h)} \ 40 \\ - 26 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(i)} \ 33 \\ - 18 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(j)} \ 78 \\ - 25 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(k)} \ 50 \\ - 25 \\ \hline \end{array}$$

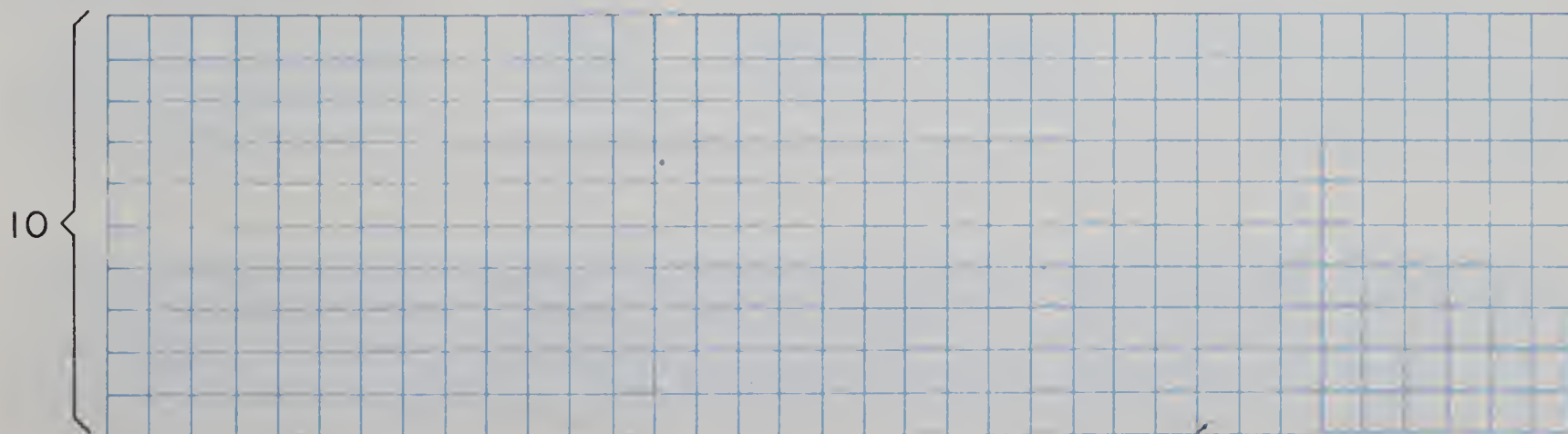
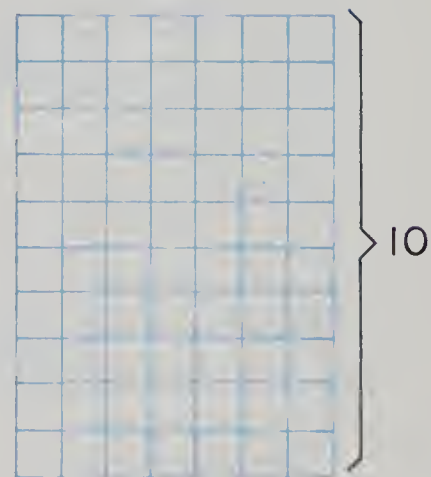
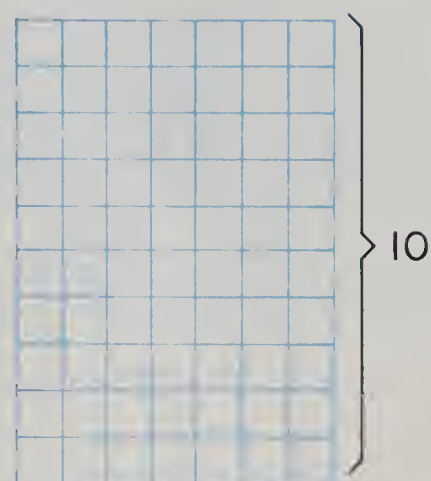
$$\begin{array}{r} \text{(l)} \ 88 \\ - 44 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(m)} \ 32 \\ - 19 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(n)} \ 27 \\ - 27 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(o)} \ 31 \\ - 13 \\ \hline \end{array}$$

(Draw sketches if you need to.)



Write only the digit that will be in the units place in the result.

Write only the digit that will be in the tens place in the result.

	A	B	C	D	E
	35	30	29	40	32
I	$\begin{array}{r} 35 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 30 \\ - 16 \\ \hline \end{array}$	$\begin{array}{r} 29 \\ - 23 \\ \hline \end{array}$	$\begin{array}{r} 40 \\ - 17 \\ \hline \end{array}$	$\begin{array}{r} 32 \\ - 23 \\ \hline \end{array}$
	2	4			

	F	G	H	I	J
	35	30	29	40	32
	$\begin{array}{r} 35 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 30 \\ - 16 \\ \hline \end{array}$	$\begin{array}{r} 29 \\ - 23 \\ \hline \end{array}$	$\begin{array}{r} 40 \\ - 17 \\ \hline \end{array}$	$\begin{array}{r} 32 \\ - 23 \\ \hline \end{array}$
	3	1	0		

	55	55	66	67	51
II	$\begin{array}{r} 55 \\ - 23 \\ \hline \end{array}$	$\begin{array}{r} 55 \\ - 32 \\ \hline \end{array}$	$\begin{array}{r} 66 \\ - 33 \\ \hline \end{array}$	$\begin{array}{r} 67 \\ - 47 \\ \hline \end{array}$	$\begin{array}{r} 51 \\ - 15 \\ \hline \end{array}$

	55	55	66	67	51
	$\begin{array}{r} 55 \\ - 23 \\ \hline \end{array}$	$\begin{array}{r} 55 \\ - 32 \\ \hline \end{array}$	$\begin{array}{r} 66 \\ - 33 \\ \hline \end{array}$	$\begin{array}{r} 67 \\ - 47 \\ \hline \end{array}$	$\begin{array}{r} 51 \\ - 15 \\ \hline \end{array}$

	75	67	75	95	98
III	$\begin{array}{r} 75 \\ - 43 \\ \hline \end{array}$	$\begin{array}{r} 67 \\ - 48 \\ \hline \end{array}$	$\begin{array}{r} 75 \\ - 65 \\ \hline \end{array}$	$\begin{array}{r} 95 \\ - 84 \\ \hline \end{array}$	$\begin{array}{r} 98 \\ - 89 \\ \hline \end{array}$

	75	67	75	95	98
	$\begin{array}{r} 75 \\ - 43 \\ \hline \end{array}$	$\begin{array}{r} 67 \\ - 48 \\ \hline \end{array}$	$\begin{array}{r} 75 \\ - 65 \\ \hline \end{array}$	$\begin{array}{r} 95 \\ - 84 \\ \hline \end{array}$	$\begin{array}{r} 98 \\ - 89 \\ \hline \end{array}$

Find the results.

	K	L	M	N	O
	35	30	29	40	32
IV	$\begin{array}{r} 35 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 30 \\ - 16 \\ \hline \end{array}$	$\begin{array}{r} 29 \\ - 23 \\ \hline \end{array}$	$\begin{array}{r} 40 \\ - 17 \\ \hline \end{array}$	$\begin{array}{r} 32 \\ - 23 \\ \hline \end{array}$
	32	14			

	55	55	66	67	51
V	$\begin{array}{r} 55 \\ - 23 \\ \hline \end{array}$	$\begin{array}{r} 55 \\ - 32 \\ \hline \end{array}$	$\begin{array}{r} 66 \\ - 33 \\ \hline \end{array}$	$\begin{array}{r} 67 \\ - 47 \\ \hline \end{array}$	$\begin{array}{r} 51 \\ - 15 \\ \hline \end{array}$

	75	67	75	95	98
VI	$\begin{array}{r} 75 \\ - 43 \\ \hline \end{array}$	$\begin{array}{r} 67 \\ - 48 \\ \hline \end{array}$	$\begin{array}{r} 75 \\ - 65 \\ \hline \end{array}$	$\begin{array}{r} 95 \\ - 84 \\ \hline \end{array}$	$\begin{array}{r} 98 \\ - 89 \\ \hline \end{array}$

What Are My Rules?

I.	4	2	2
	8	6	2
	10	8	2
	6	4	
	9		2
		10	2
	15	13	
	31		2
		0	2
		98	2

II.

5	1	14	6	7		19			29		57		x
8	4	17			16		23	3		42		101	x + 3

Write only the digit that will be in the units place in the result.

Write only the digit that will be in the tens place in the result.

I

A	B	C	D	E
$\begin{array}{r} 13 \\ +18 \\ \hline \end{array}$	$\begin{array}{r} 49 \\ -12 \\ \hline \end{array}$	$\begin{array}{r} 52 \\ -11 \\ \hline \end{array}$	$\begin{array}{r} 24 \\ +19 \\ \hline \end{array}$	$\begin{array}{r} 53 \\ -6 \\ \hline \end{array}$
1	7	1		

F

F	G	H	I	J
$\begin{array}{r} 13 \\ +18 \\ \hline \end{array}$	$\begin{array}{r} 49 \\ -12 \\ \hline \end{array}$	$\begin{array}{r} 52 \\ -11 \\ \hline \end{array}$	$\begin{array}{r} 24 \\ +19 \\ \hline \end{array}$	$\begin{array}{r} 53 \\ -6 \\ \hline \end{array}$

II

$\begin{array}{r} 19 \\ +28 \\ \hline \end{array}$	$\begin{array}{r} 65 \\ -12 \\ \hline \end{array}$	$\begin{array}{r} 92 \\ -33 \\ \hline \end{array}$	$\begin{array}{r} 27 \\ +34 \\ \hline \end{array}$	$\begin{array}{r} 99 \\ -32 \\ \hline \end{array}$

III

$\begin{array}{r} 19 \\ +28 \\ \hline \end{array}$	$\begin{array}{r} 65 \\ -12 \\ \hline \end{array}$	$\begin{array}{r} 92 \\ -33 \\ \hline \end{array}$	$\begin{array}{r} 27 \\ +34 \\ \hline \end{array}$	$\begin{array}{r} 99 \\ -32 \\ \hline \end{array}$

III

$\begin{array}{r} 56 \\ +15 \\ \hline \end{array}$	$\begin{array}{r} 89 \\ -16 \\ \hline \end{array}$	$\begin{array}{r} 91 \\ -12 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ +69 \\ \hline \end{array}$	$\begin{array}{r} 100 \\ -13 \\ \hline \end{array}$

IV

$\begin{array}{r} 56 \\ +15 \\ \hline \end{array}$	$\begin{array}{r} 89 \\ -16 \\ \hline \end{array}$	$\begin{array}{r} 91 \\ -12 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ +69 \\ \hline \end{array}$	$\begin{array}{r} 100 \\ -13 \\ \hline \end{array}$

Find the results.

IV

K	L	M	N	O
$\begin{array}{r} 13 \\ +18 \\ \hline \end{array}$	$\begin{array}{r} 49 \\ -12 \\ \hline \end{array}$	$\begin{array}{r} 52 \\ -11 \\ \hline \end{array}$	$\begin{array}{r} 24 \\ +19 \\ \hline \end{array}$	$\begin{array}{r} 53 \\ -6 \\ \hline \end{array}$
$\begin{array}{r} 19 \\ +28 \\ \hline \end{array}$	$\begin{array}{r} 65 \\ -12 \\ \hline \end{array}$	$\begin{array}{r} 92 \\ -33 \\ \hline \end{array}$	$\begin{array}{r} 27 \\ +34 \\ \hline \end{array}$	$\begin{array}{r} 99 \\ -32 \\ \hline \end{array}$
$\begin{array}{r} 56 \\ +15 \\ \hline \end{array}$	$\begin{array}{r} 89 \\ -16 \\ \hline \end{array}$	$\begin{array}{r} 91 \\ -12 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ +69 \\ \hline \end{array}$	$\begin{array}{r} 100 \\ -13 \\ \hline \end{array}$

What Are My Rules?

I.

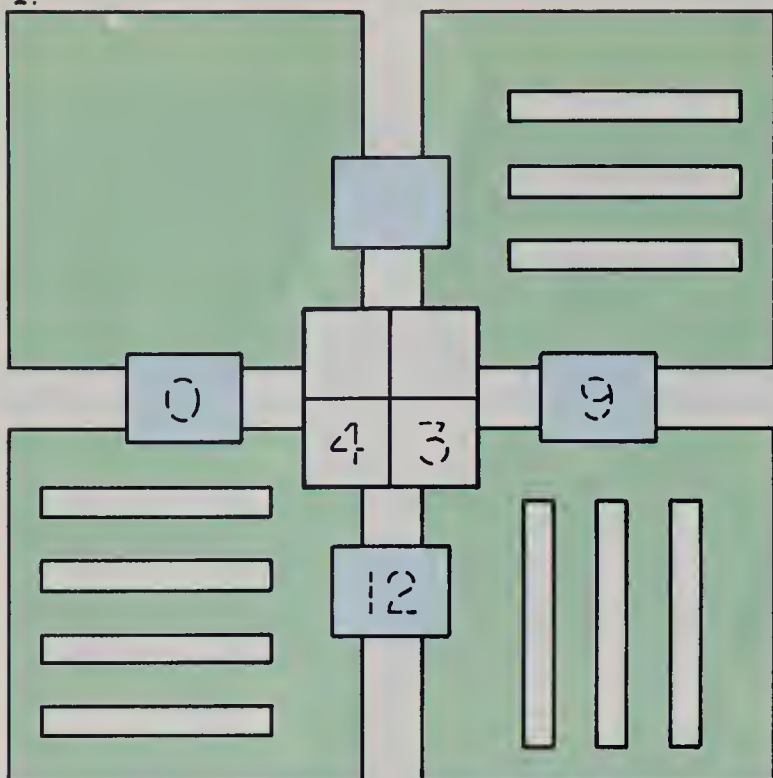
9	1	10
5	5	10
10	0	10
6	4	
1		10
	8	10
7	3	
4		10
	0	10
3		10

II.

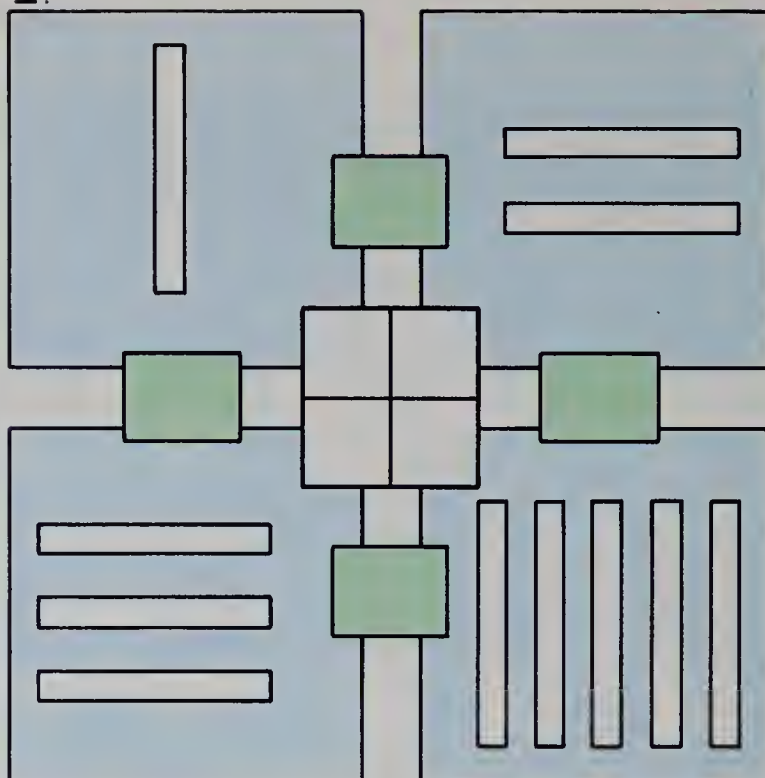
2	10	5	4		3		11		17		57		x
12	20	15		16		17		23		10		109	x + 10

What Are My Rules?

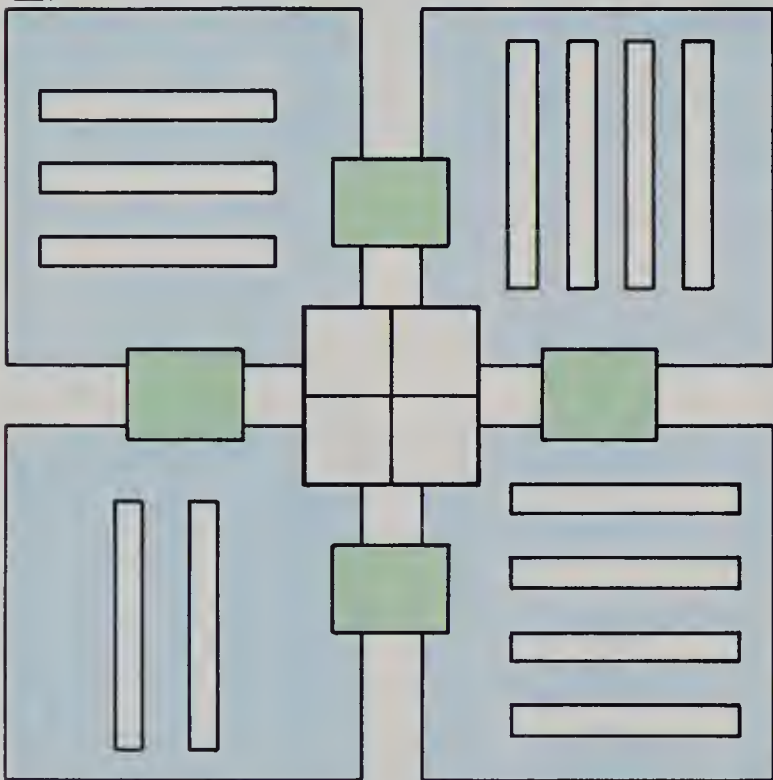
I.



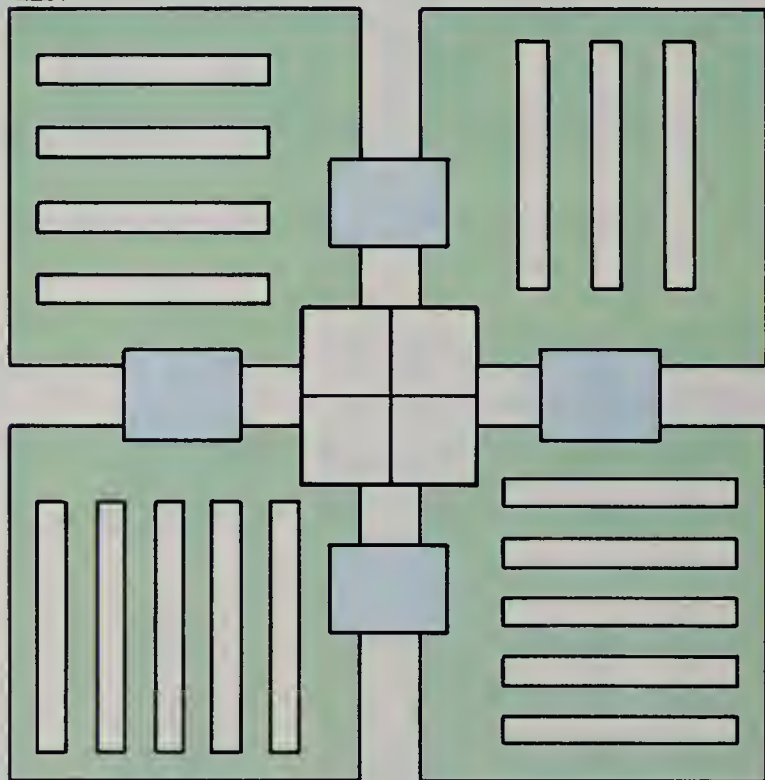
II.



III.



IV.



V.



Fewest Coins —
dimes and pennies.

twice as much

____ d., ____ p.

half as much

____ d., ____ p.

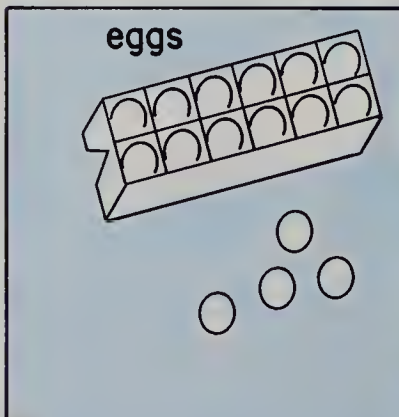
3 times as much

____ d., ____ p.

4 times as much

____ d., ____ p.

VI.



Fewest Units —
dozens and eggs.

twice as many

____ doz., ____ eggs

half as many

____ doz., ____ eggs

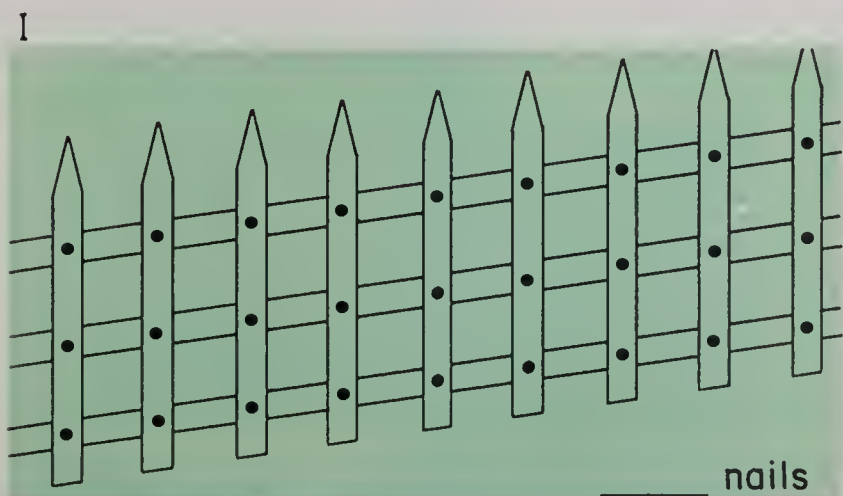
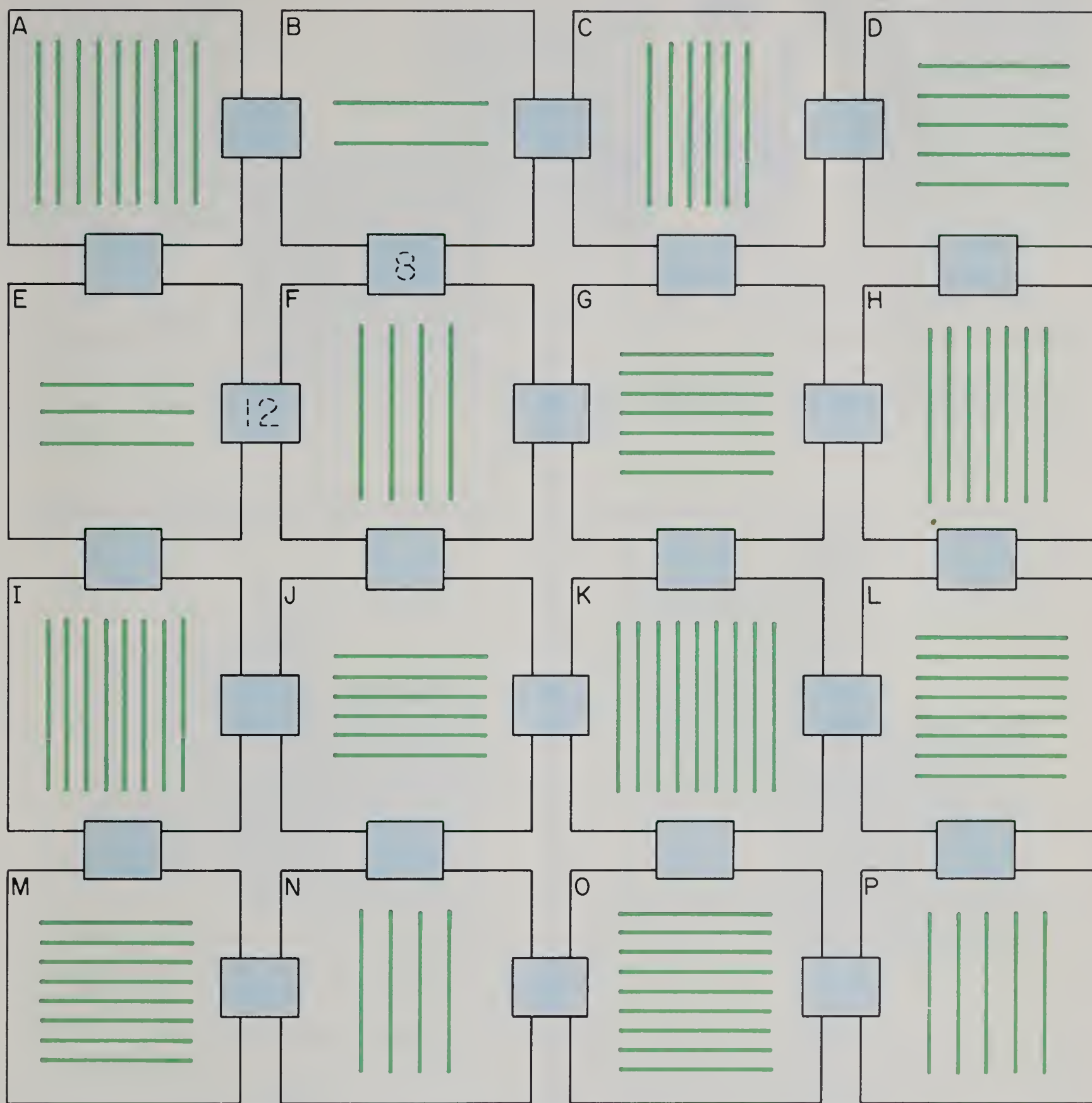
3 times as many

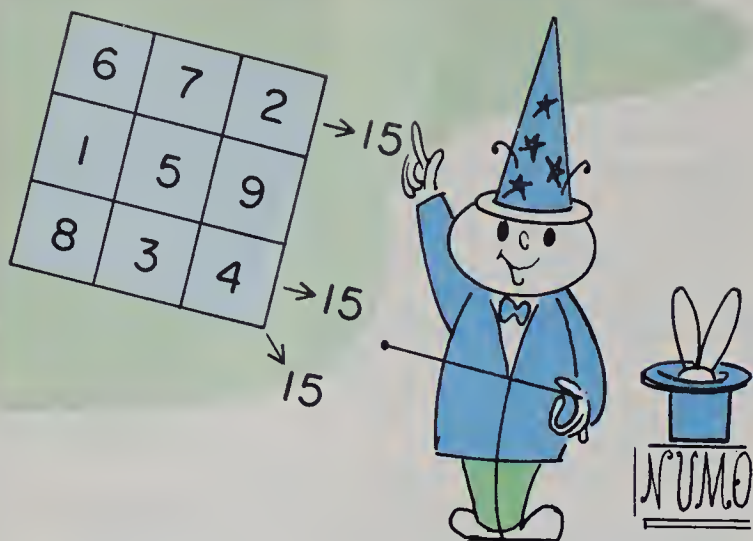
____ doz., ____ eggs

4 times as many

____ doz., ____ eggs

You may need a piece of scratch paper to see what happens when the lines cross in some of the examples.





“Gee whiz! It’s really a MagicSquare. Pick any row or column or diagonal: add the 3 numbers — and the sum is 15.

“That’s magic! That gives me a score of 8 points — one for each row or column or diagonal with the sum 15.

“Here’s another square with the same numbers — 1 through 9. Is it magic? Do I get 8 points for this one? You find out.”

A

2	9	4	
7	5	3	15
6	1	8	
			15

Score: _____

“Here is another. What score do I get for it?”

B

4	3	8	
9	5	1	
2	7	6	

Score: _____

“Some squares are not magic all the way; so, I wouldn’t get 8 points for them. How many points would you give me for this one?”

C

1	8	6	15
3	5	7	
4	9	2	
			8

Score: _____

“Here’s one that gave me a very low score.”

D

1	2	3	
4	5	6	
7	8	9	

Score: _____

“Can you get a zero score?”

E

Score: 0

“What score do I get for these squares?”

F

8	1	5	
3	6	7	
4	9	2	

Score: _____

G

2	9	4	
3	5	7	
6	1	8	

Score: _____

H

2	7	6	
5	9	1	
4	3	8	

Score: _____

When Numo gets tired of using only the numbers 1 through 9, he tries other groups of numbers.

“Once I tried odd numbers. Here is my work. What’s my score?”

I

9	1	11	
5	15	13	
7	17	3	

Score: _____

“That’s a low score! I counted the number of times I got 27. That was low. I counted the times I got 33. That was no better. I tried again:

J

3	13	11	
17	9	1	
7	5	15	

Score: _____

“That’s a better score.”

“Next, I tried even numbers and got a perfect score of 8. Can you finish the square as I did?”

K

	6		
	10		
4	14	12	

Score: 8

“Next, I jumped around in picking my numbers. What score would you give me?”

L

11	7	4	
1	8	15	
12	9	5	

Score: _____

“Can you use these same 9 numbers to get a perfect score?” _____

All About Coins

Find the 6 ways to make 18¢ with coins. In keeping track, you quickly learn the shorthand we use.

How many coins are there in each of the ways to make 18¢?

18¢

0 d, 0 n, 18 p. (or 18 coins)

1 d, 0 n, 8 p. (or 9 coins)

0 d, 3 n, 3 p. (or coins)

0 d, 2 n, p. (or coins)

0 d, 1 n, p. (or coins)

 d, 1 n, 3 p. (or coins)

Notice that only 5 coins were required in the last combination. We say that 5 coins are the "fewest coins" needed to make 18¢.

FEWEST COINS

Show how the amounts given could be made with the fewest coins.

14¢ 1 d, 0 n, p.

7¢ d, n, p.

16¢ d, n, p.

20¢ d, n, p.

24¢ d, n, p.

More About Fewest Coins

1. Show how the amounts in the blue blocks can be made with the fewest coins.
2. Find the sum of the amounts shown in the blue blocks.
3. Then show the fewest coins needed to make this amount.

A. 8¢ 0 d, n, p.

+ 7¢ 0 d, n, p.

15¢ 1 d, n, p.

B. 9¢ d, n, p.

+ 12¢ d, n, p.

¢ d, n, p.

C. 6¢ d, n, p.

+ 16¢ d, n, p.

¢ d, n, p.

D. 15¢ d, n, p.

+ 9¢ d, n, p.

¢ d, n, p.

Problem: Can you find any amount less than 25¢ which can be made by the same number of coins in two different ways?

More About Coins

8¢	<u>0</u> d, <u>8</u> p	25¢	<u> </u> d, <u>5</u> p
13¢	<u>1</u> d, <u> </u> p	10¢	<u> </u> d, <u> </u> p
21¢	<u> </u> d, <u> </u> p	36¢	<u> </u> d, <u> </u> p
59¢	<u> </u> d, <u> </u> p	82¢	<u> </u> d, <u> </u> p

Use the fewest dimes and pennies for each amount.

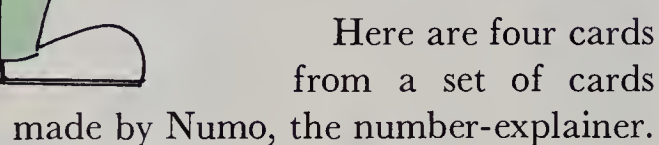
F

	\$	3	d,	7	p
+	\$	2	d,	6	p
	\$		d,		p

$$\begin{array}{r} \text{N} \\ 70\text{¢} \quad \text{---d, ---p} \\ - 47\text{¢} \quad \text{---d, ---p} \\ \hline \text{¢} \quad \text{---d, ---p} \end{array}$$

P

47¢	___d, ___p
19¢	___d, ___p
5¢	___d, ___p
¢	___d, ___p



Here is what you will find on the backs of those cards.

Rule A 1	Rule B 2
Rule C	Rule D 4

BACK	
Rule A 3	Rule B
Rule C 9	Rule D 12

BACK	
Rule A	Rule B
	8
Rule C	Rule D
12	16

BACK	
Rule A 2	Rule B 4
Rule C 6	Rule D

Can you find the back which goes with each card above? Can you fill in the missing numbers?

FRONT

II

Math

FRONT

III Math

Math

Math

Math

FRONT

IV

Math

Math

Math

Here are some more cards from this set.
You fill in the boxes.

FRONT		BACK	
V Math Math Math	Math	Rule A 5	Rule B 10
	Math	Rule C	Rule D 20
	Math		

FRONT		BACK	
VI		Rule A O	Rule B O
		Rule C	Rule D

FRONT		BACK	
VII	Math	Rule A	Rule B
	Math		
	Math	Rule C	Rule D
	Math		
	Math		
	Math		

FRONT		BACK	
VIII	Math	Rule A	Rule B
	Math		
	Math	Rule C	Rule D
	Math		24

A		B		C		D		E	
FRONT	BACK	FRONT	BACK						
4	7	7	9	10		20	25	17	
3	1	2	5	4	6	5		3	14

F		G		H		I		J	
FRONT	BACK								
16	22	12	20	16		30			
				7			20	8	12

K		L		M		N		O	
	42		7		21		16		15
10			3	9			0		5

What
Are
My
Rules?

U	FRONT	BACK
4¢ each or 2 for 7¢	Rule A	Rule B
	4¢	7¢
	Rule C	Rule D
	11¢	14¢

V	FRONT	BACK
2¢ each or 3 for 5¢	Rule A	Rule B
	2¢	4¢
	Rule C	Rule D
	5¢	7¢

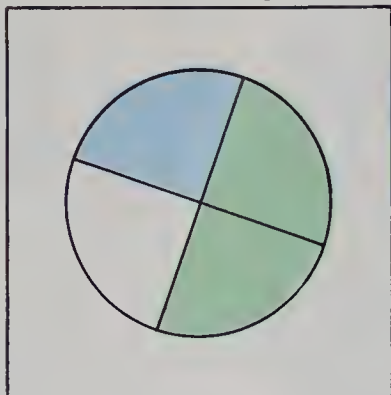
W	FRONT	BACK
3¢ each or 2 for 5¢	Rule A	Rule B
	¢	¢
	Rule C	Rule D
	¢	¢

X	FRONT	BACK
4¢ each or 3 for 10¢	Rule A	Rule B
	¢	
	Rule C	Rule D

Y	FRONT	BACK
6¢ each or 3 for _____¢	Rule A	Rule B
	¢	
	Rule C	Rule D
		21¢

Z	FRONT	BACK
_____¢ each or 3 for _____¢	Rule A	Rule B
		10¢
	Rule C	Rule D
		18¢

A FRONT



BACK

Rule I I	Rule II 2
Rule III 3	Rule IV 4

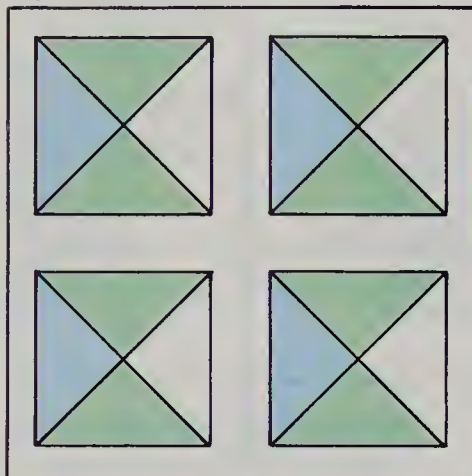
B FRONT



BACK

I 2	II
III 6	IV 8

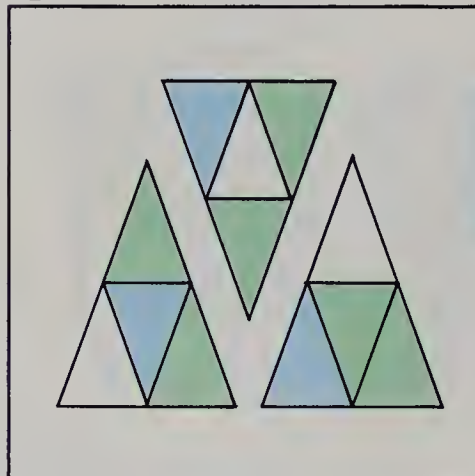
C FRONT



BACK

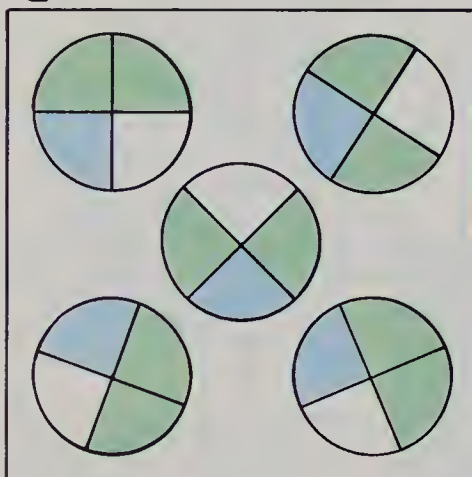
I 4	II
III	IV

D



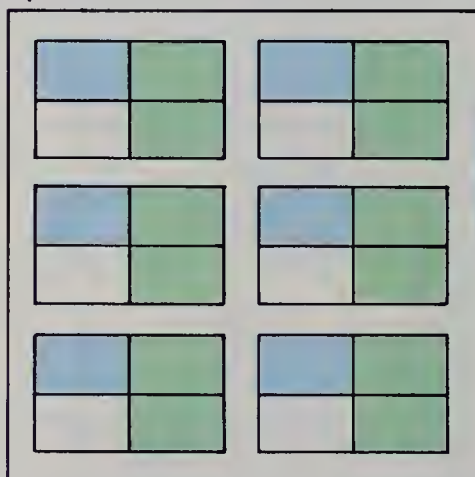
I	II 6
III	IV

E



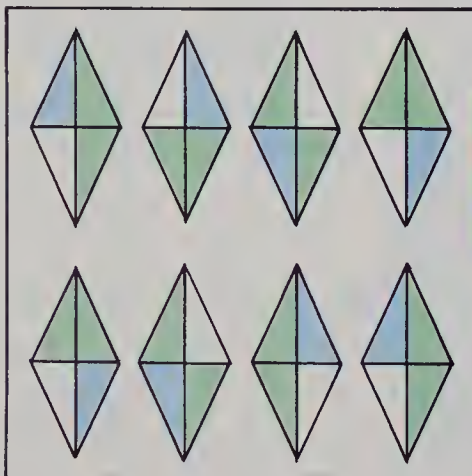
I	II
III	IV

F



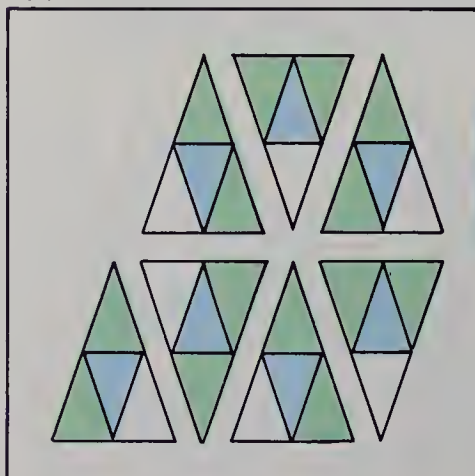
I	II
III	IV

G



I	II
III	IV

H



I	II
III	IV

A

FRONT	BACK	
	Rule I 5	Rule II 6
	Rule III 10	Rule IV

B

FRONT	BACK	
	Rule I 2	Rule II 1
	Rule III	Rule IV 2

C

FRONT	BACK	
	Rule I 4	Rule II 3
	Rule III	Rule IV

D

FRONT	BACK	
	I	II
	III	IV

E

FRONT	BACK	
	I	II
	III 12	IV 16

F

FRONT	BACK	
	I	II
	III	IV 6

G

FRONT	BACK	
	I	II
	III	IV

H

FRONT	BACK	
	I	II
	III	IV

Another game of What's My Rule?

a	b	c	d	e	f	g	h	i	j	k	l
8	13	11	20	15		20	50			50	m
5	13	4	10		3	9		20	15	24	n
3	0			4	9		40	30	35		m - n

What's My Rule?

2	4	0	0	3	6	1	2	4	8
6		5		20	8	7		30	100

Select cards so that the blue sides make true mathematical sentences.

WAMR... Set E

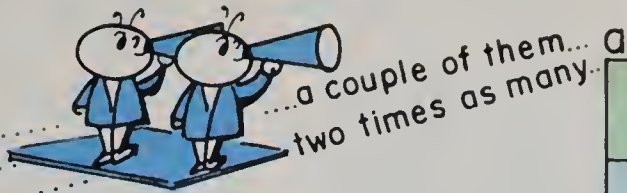
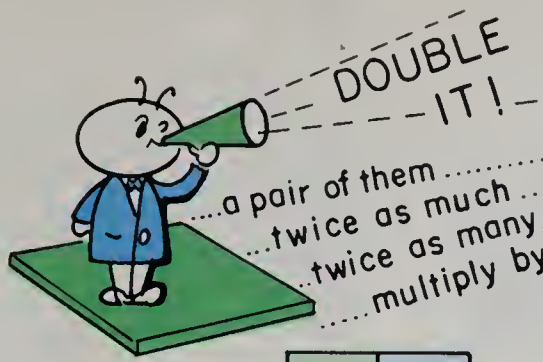
$\begin{array}{r} 2 \\ + 3 \\ \hline 5 \end{array}$	$\begin{array}{r} 6 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + \\ \hline 5 \end{array}$	$\begin{array}{r} 8 + 7 = \\ \hline 16 \end{array}$	$\begin{array}{r} 15 + = 20 \\ \hline \end{array}$
$\begin{array}{r} 6 \\ + \\ \hline 15 \end{array}$	$\begin{array}{r} 18 \\ + \\ \hline 12 \end{array}$	$\begin{array}{r} 26 \\ + \\ \hline 40 \end{array}$	$\begin{array}{r} + 15 = \\ \hline 42 \end{array}$	$\begin{array}{r} + = 24 \\ \hline 30 \end{array}$
			$\begin{array}{r} + = 40 \\ \hline 50 \end{array}$	$\begin{array}{r} + 32 = \\ \hline 100 \end{array}$

What do you notice about the green sides?

Let's try some subtraction sentences.

$\begin{array}{r} 5 - 2 = \\ \hline 10 \end{array}$	$\begin{array}{r} 12 - 8 = \\ \hline \end{array}$	$\begin{array}{r} 23 \\ - 17 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - \\ \hline 5 \end{array}$	$\begin{array}{r} 40 \\ - \\ \hline 60 \end{array}$
$\begin{array}{r} 20 - = 15 \\ \hline \end{array}$	$\begin{array}{r} - 7 = 14 \\ \hline \end{array}$	$\begin{array}{r} 44 \\ - \\ \hline 36 \end{array}$	$\begin{array}{r} 37 \\ - \\ \hline 74 \end{array}$	$\begin{array}{r} 72 \\ - \\ \hline 28 \end{array}$
$\begin{array}{r} 20 - = \\ \hline 30 \end{array}$	$\begin{array}{r} - 14 = \\ \hline 14 \end{array}$			

Extra 1, 1, 2, 3, 5, 8, 21, 233



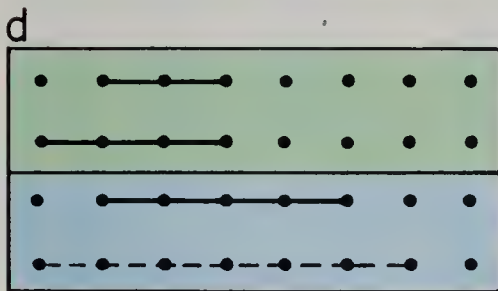
5 days	
1 week and	days

8	16
---	----

6 inches
1 foot

15¢	
-----	--

	24¢
--	-----

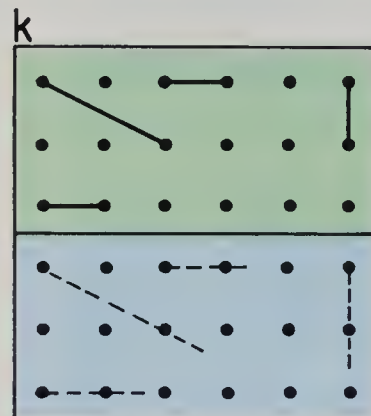


5	
---	--

50

8 in.	
ft. and	in.

17 miles	
----------	--



200	
-----	--

a rise from 15° to 21°	a rise from 15° to
---------------------------	-----------------------

6 months

8 ounces

	1 wk. and 5 da.
--	-----------------

	1 hr. and 10 min.
--	-------------------

	twenty-two
--	------------

	500
--	-----

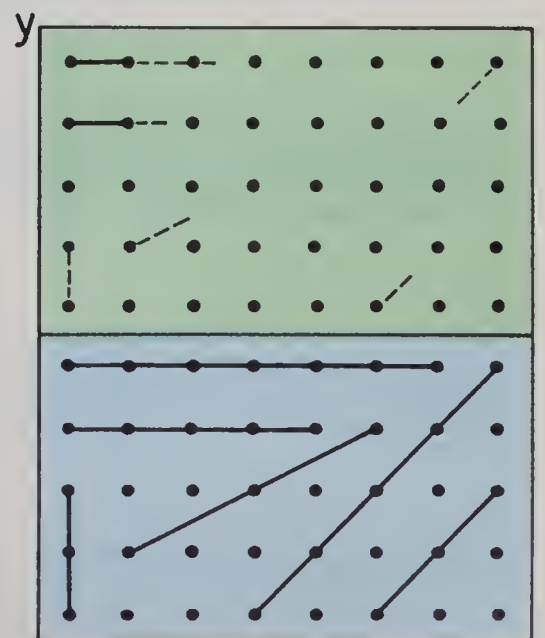
25¢

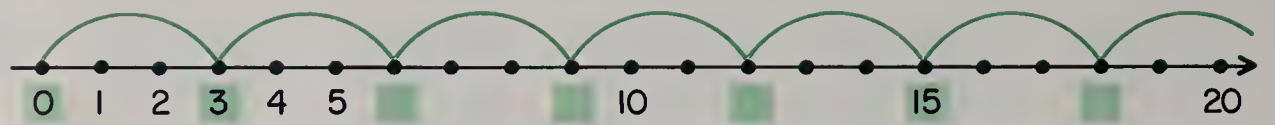
	1 doz. eggs
--	-------------

A PRICE of 2 for 5¢
A PRICE of for

1 ft., 10 in.

75	
----	--





WAMR... Set G

1	0	10	5	3	2
3	0	30	15	9	

A

3	+		=	
				18

B

	-	6	=	
30				

C

3	+	2	=	

D

4	+	0	=	

E

	+		=	15
		15		

F

	-		=	
		15		9

G

5	-	2	=	

H

4	-		=	4

I

	-		=	
		12		9

J

	+	4	=	
				30

K

5	+		=	7

L

	-	2	=	
				15

M

11	+		=	
				60

N

	-		=	
		21		21

Pencils
3¢ each

Erasers
2¢ each

Pads of paper
5¢ each

Notebooks
8¢ each

Number purchased

I	0	1	2	3	4	5	6
Erasers at _____¢ ea.	0 ¢	2 ¢	4 ¢	¢	¢	¢	¢

II	0	1	2	3	4	5	6
Pencils at _____¢ ea.	¢	¢	6 ¢				

III	0	1	2	3	4	5	6
Pads at _____¢ ea.	¢	5 ¢					

IV	0	1	2	3	4	5	6
Notebooks at _____¢ ea.							

A

FRONT



BACK

Rule I

3¢

Rule II

6¢

Rule III

13¢

Rule IV

1¢

B

FRONT



BACK

Rule I

6¢

Rule II

Rule III

16¢

Rule IV

4¢

C

FRONT



BACK

I

12¢

II

24¢

III

IV

10¢

D

FRONT



BACK

I

II

III

35¢

IV

E

FRONT



BACK

I

II

III

IV

F

FRONT



BACK

I

II

III

IV

G

FRONT



BACK

I

II

III

IV

H

FRONT



BACK

I

II

\$1.00

III

IV

Another game of What's My Rule?

a	b	c	d	e	f	g	h	i	j	k	l
4	10	2	8	9		15	17		14	6	r
3	5	2	2	4	4			25	16		s
7	15	4			10	20	21	30		21	r+s

What Are My Rules?

I.

			+15	-6
			35	14
+28	-10			
	10	56	65	5

II.

			+13	-11
		+19		+23
45	21		15	

III.

			+36	-25
-16			-49	
	104	119		46

IV.

			+18	
				108
	+36			+84
42		48	132	

V.

			-24	+32
			56	
		+120	-32	
176	32			240

VI.

			+13	
			35	51
	+48			
10		5	92	117

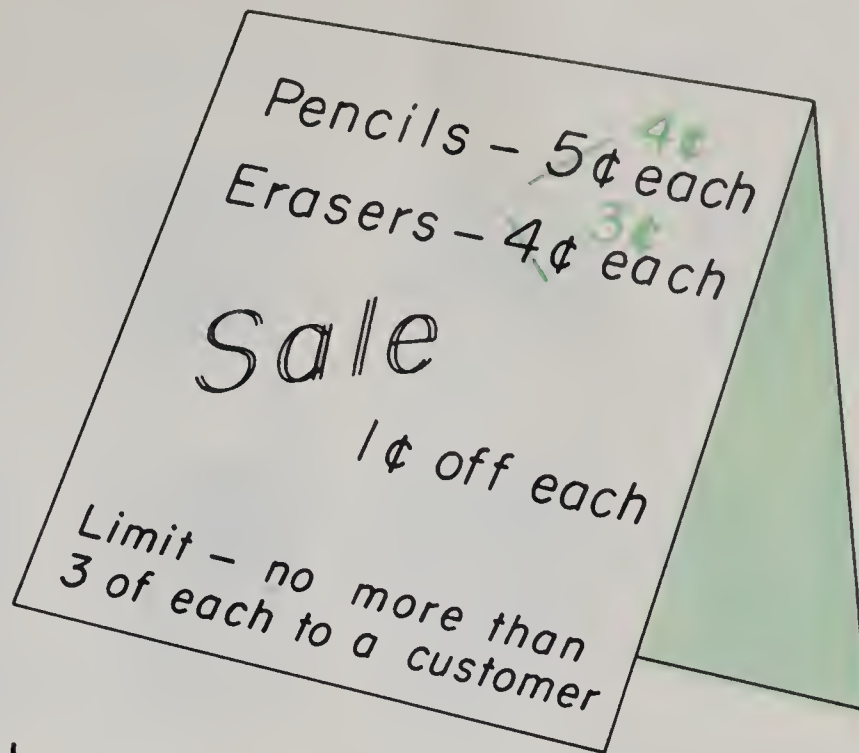
VII.

		8° above freezing	
		40°	
		20° below freezing	
32° below freezing		_____ above freezing	
		72°	
67° above freezing		_____ above freezing	
		212°	

VIII.

		Time shown	
		9:30 AM	
		40 minutes later	
		:	
3 hrs., 40 min. later		1 hr., 40 min. earlier	
:		:	
11:55 AM		7:15 PM	

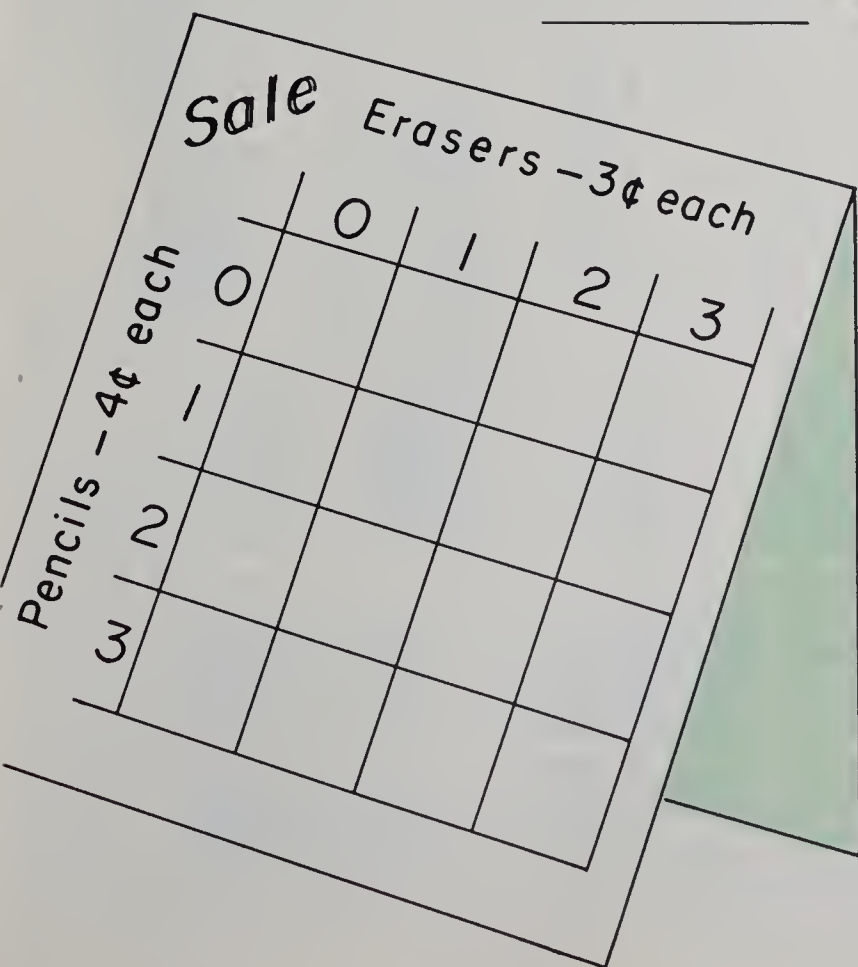
Mary's mother gave her a dime to buy a pencil and an eraser. They usually cost 5¢ and 4¢. When she got to the store, she found that there was a sale going on. Here is the sale sign on the right.



- How much would Mary now spend for a pencil and an eraser? _____
- If she bought something else, could she spend all of her dime? _____
- Bill came in the store and asked for 5 pencils. What did the clerk say? _____

- Alice gave the clerk a dime and a nickel. She received 1¢ change. What did she buy? _____

- What is the amount of the smallest purchase in this sale of pencils and erasers? _____
- What is the amount of the largest sale? _____



- Frances had a dime and two nickels. She spent as much as she could. How much did she spend? _____
- What did she buy? _____
- Jimmy spent 13¢. What did he buy? _____
- Could anyone spend exactly 19¢? _____
- What purchase amounts to 17¢? _____

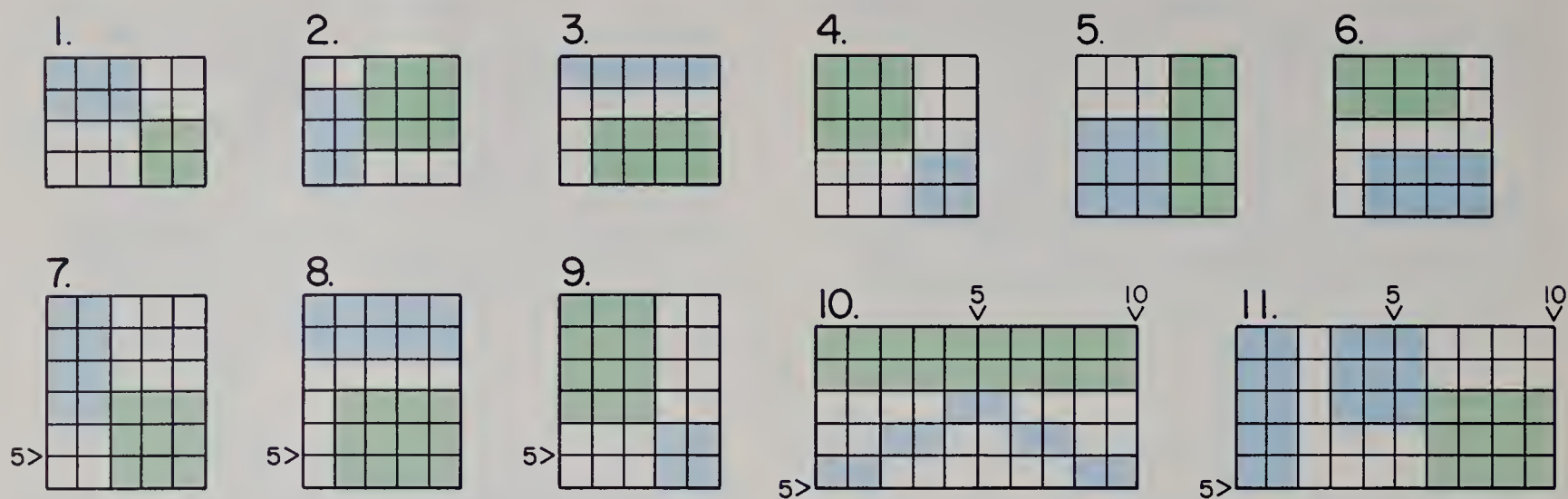
On the back of the "Sale" sign, the clerk had worked out a "time saver" chart.

Complete the chart showing all possible purchases using the rule of the sale, as set out in the sign above.

Can you know exactly what was purchased if you know the amount of the purchase?

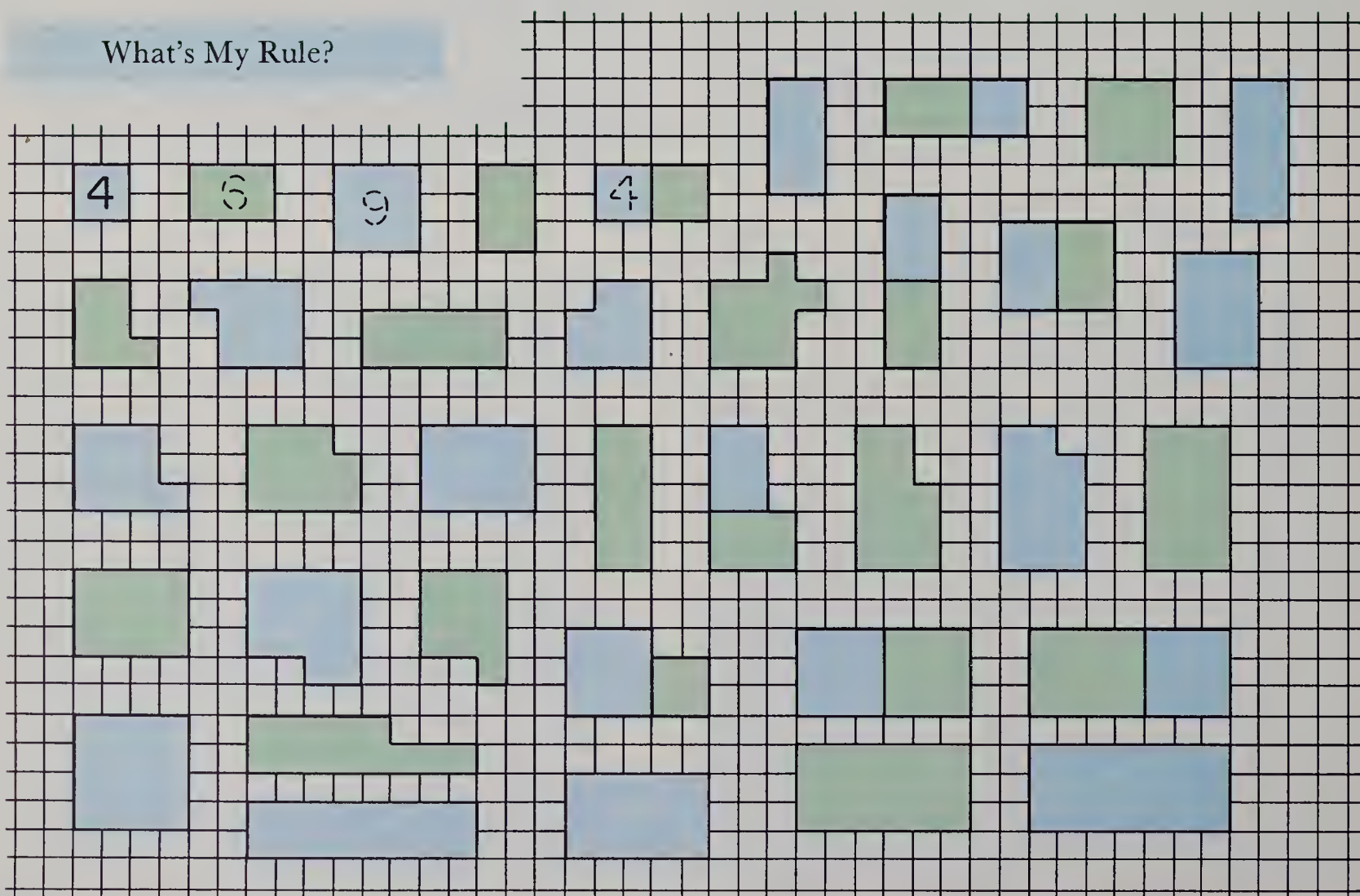
What kind of chart would the clerk need before the sale — when the prices were 5¢ and 4¢?

How many tiles? . . . How many blue, how many green, how many white?

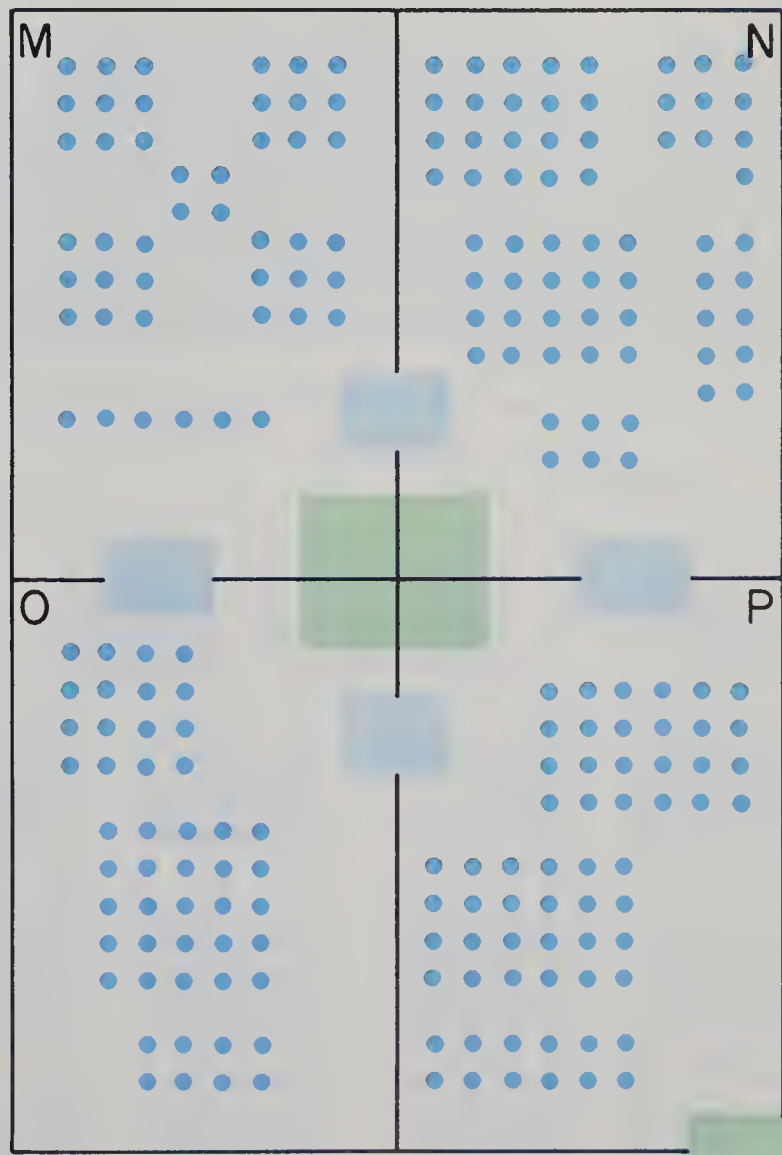
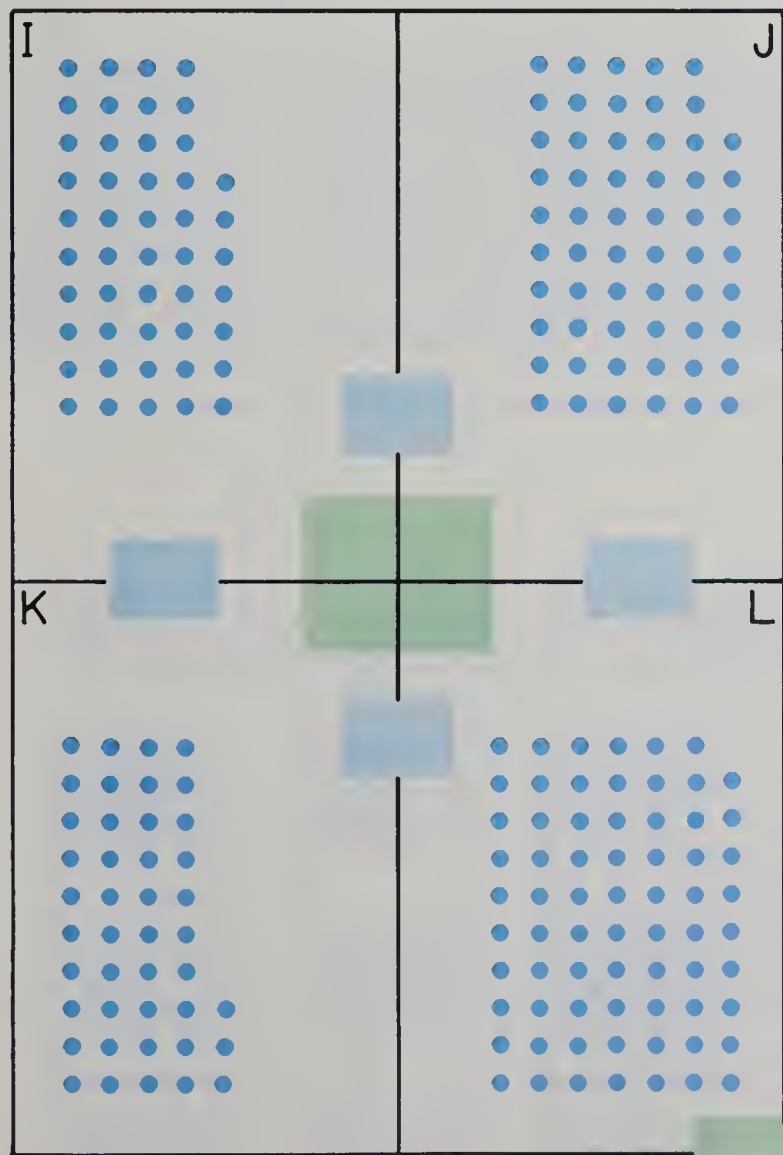
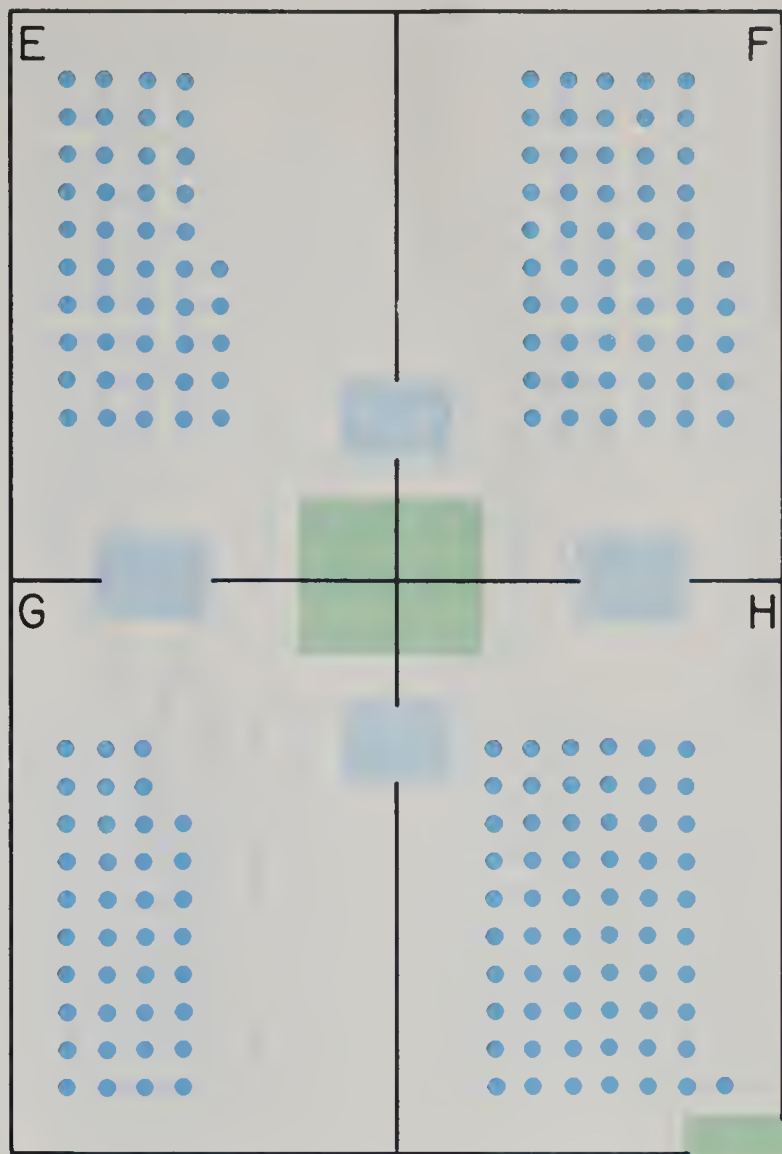
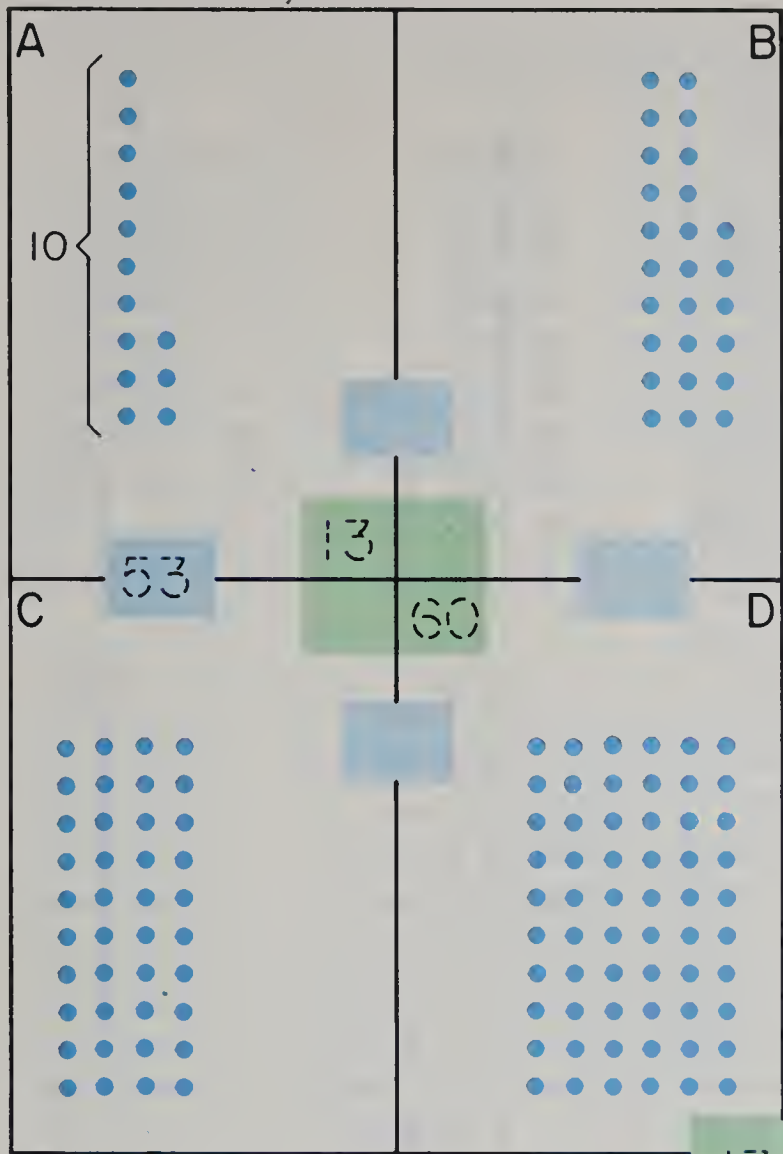


	1	2	3	4	5	6	7	8	9	10	11
Number blue	6										
Number green	4										
All	20										
Blue or green	10										
Number white	10										

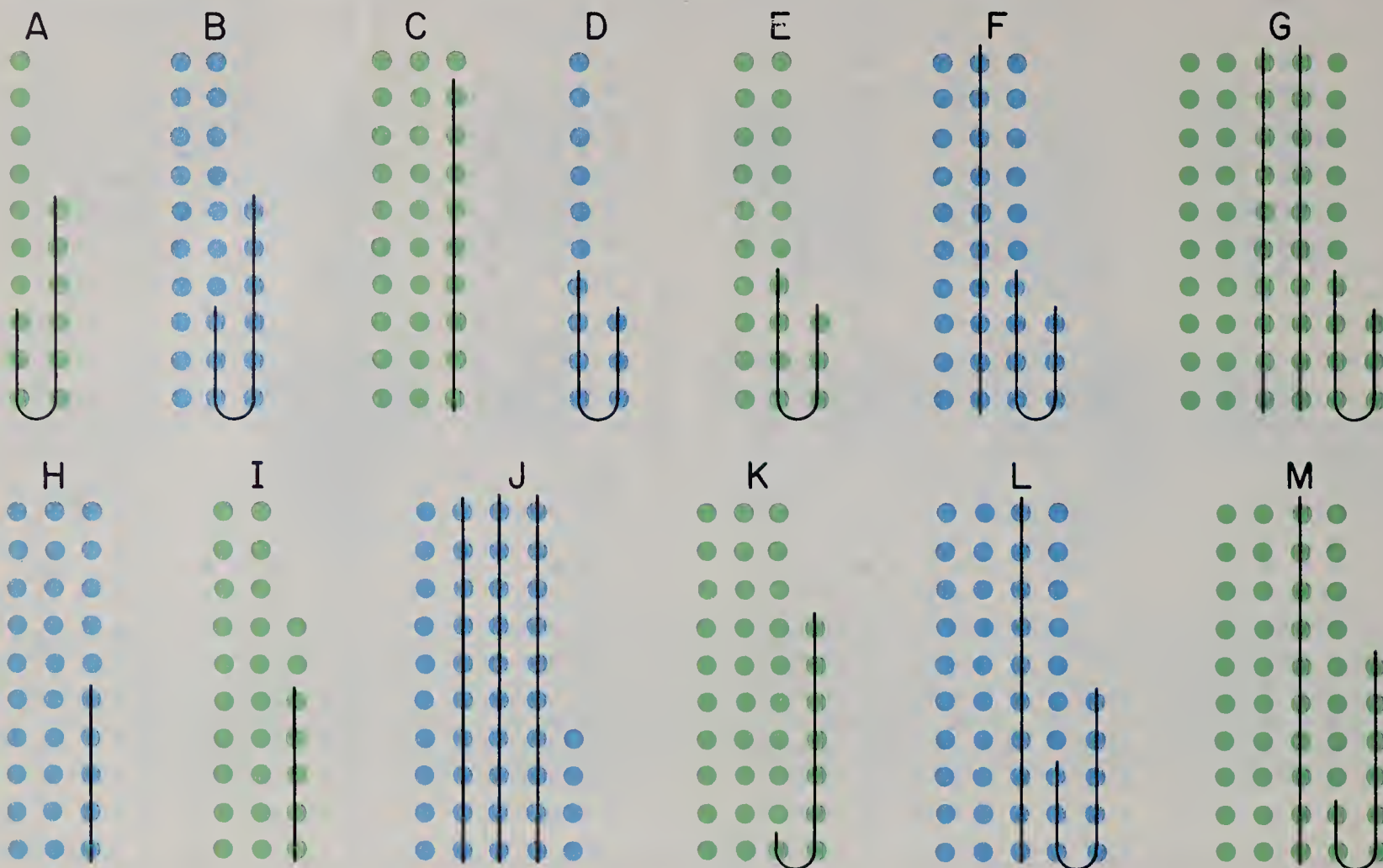
What's My Rule?



What Are My Rules?

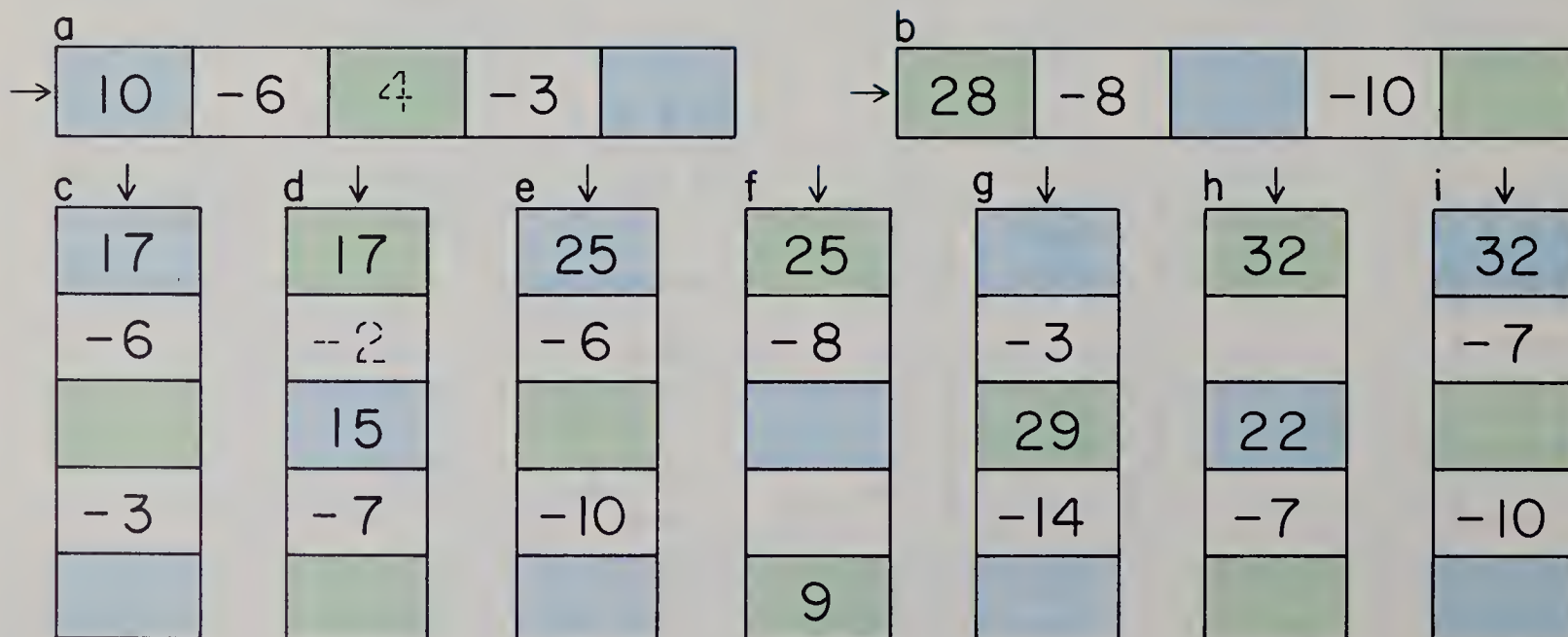


How many dots? How many crossed out? How many not crossed out?

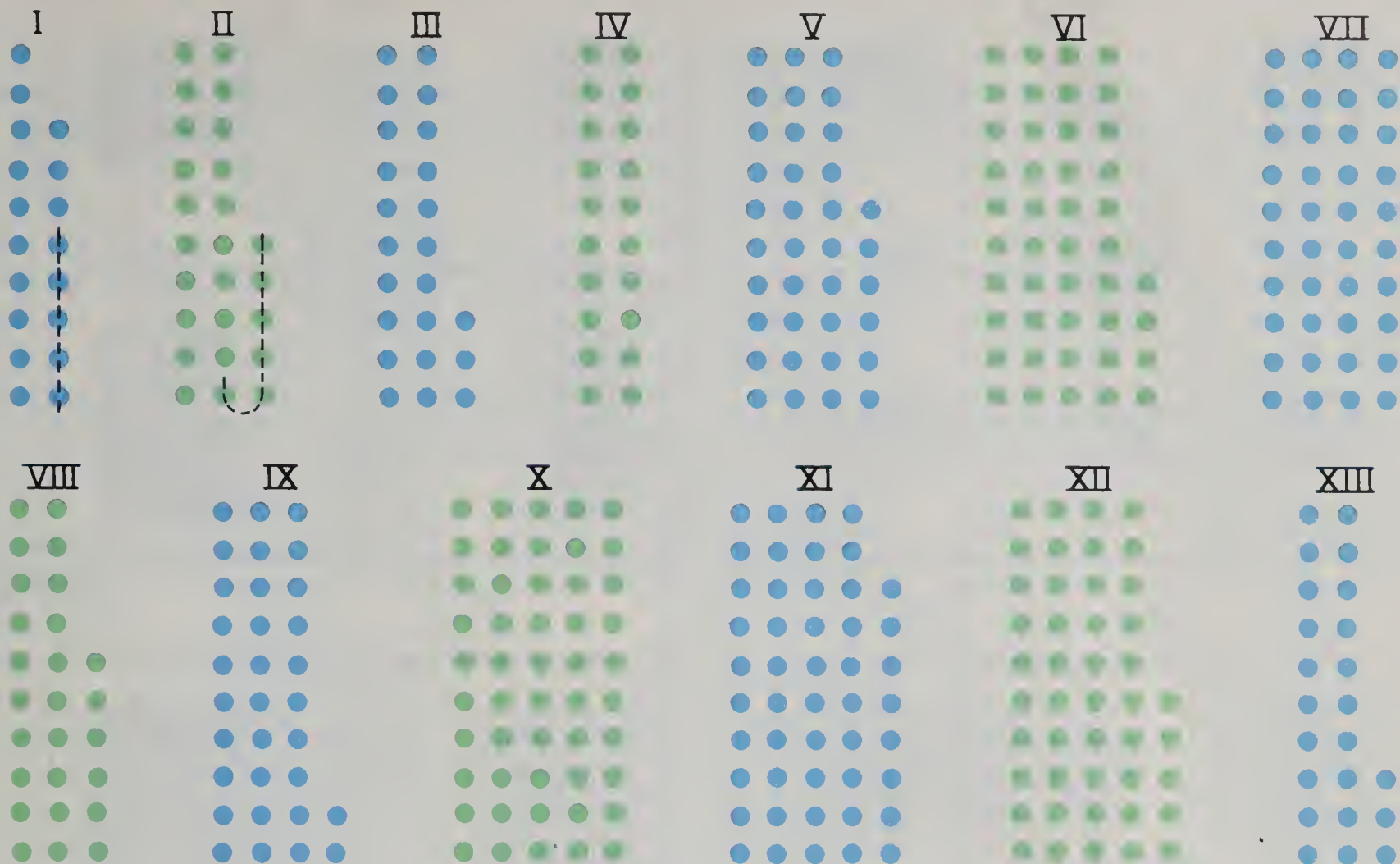


	A	B	C	D	E	F	G	H	I	J	K	L	M
All dots	16												
Crossed out	9												
Not crossed out	7												

Chain Reactions



You cross out the dots. Notice what the record tells you.



	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
All dots													
Crossed out	5	6	12	11	20	17	13	9	17	24	29	18	15
Not crossed out													

Chain Reactions

A

23

-2

-10

B

-1

19

9

C

44

-7

-10

D

40

37

27

E

32

25

-10

F

-4

46

26

G

48

39

-20

H

45

-10

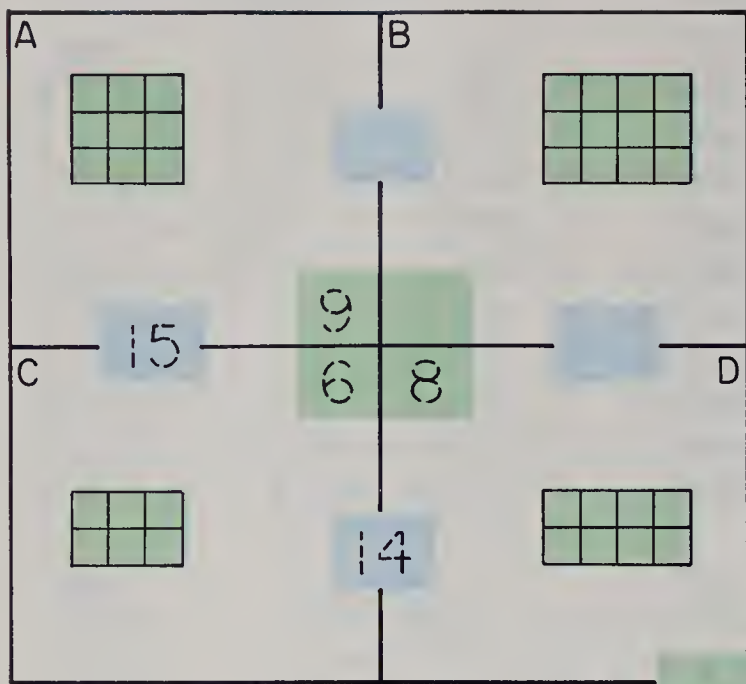
27

I

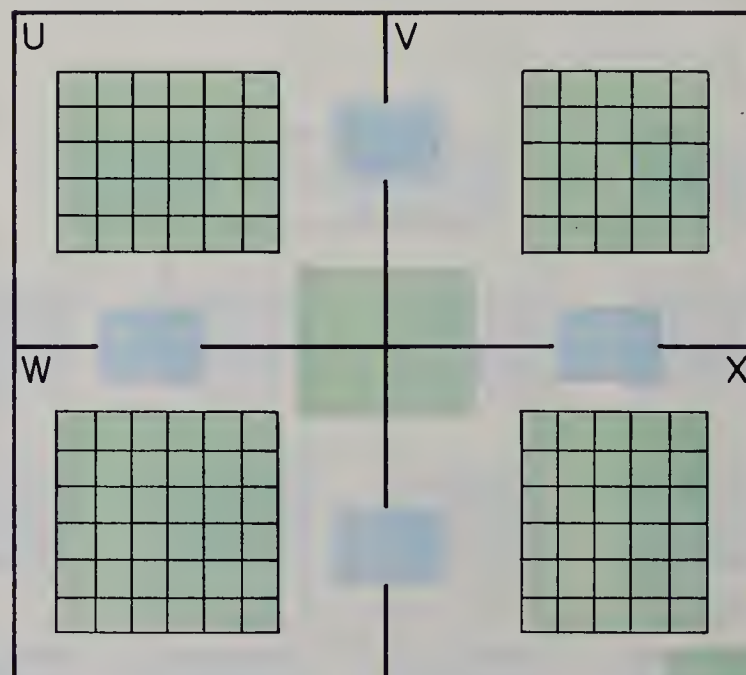
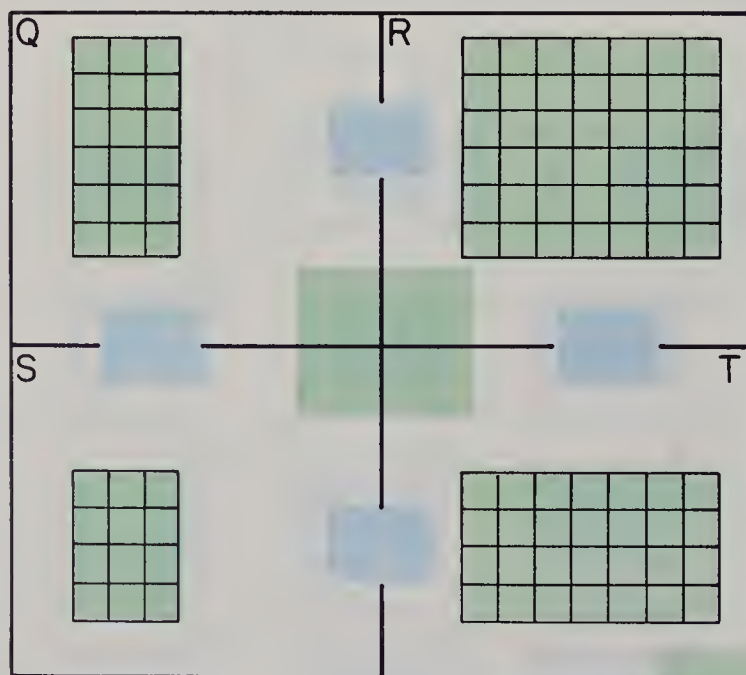
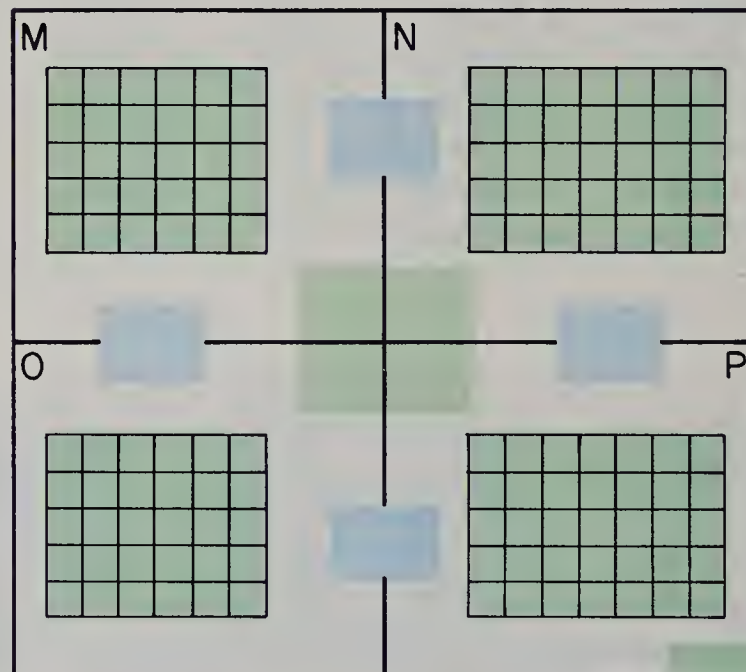
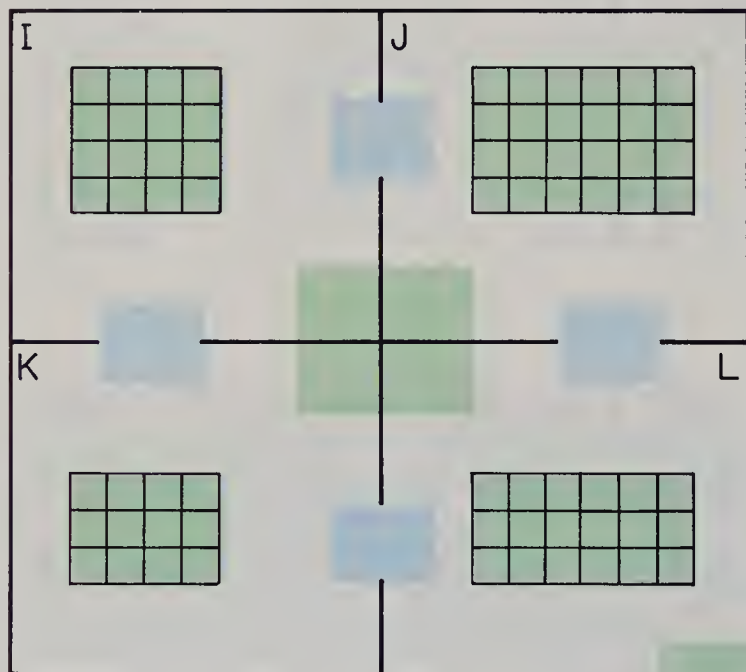
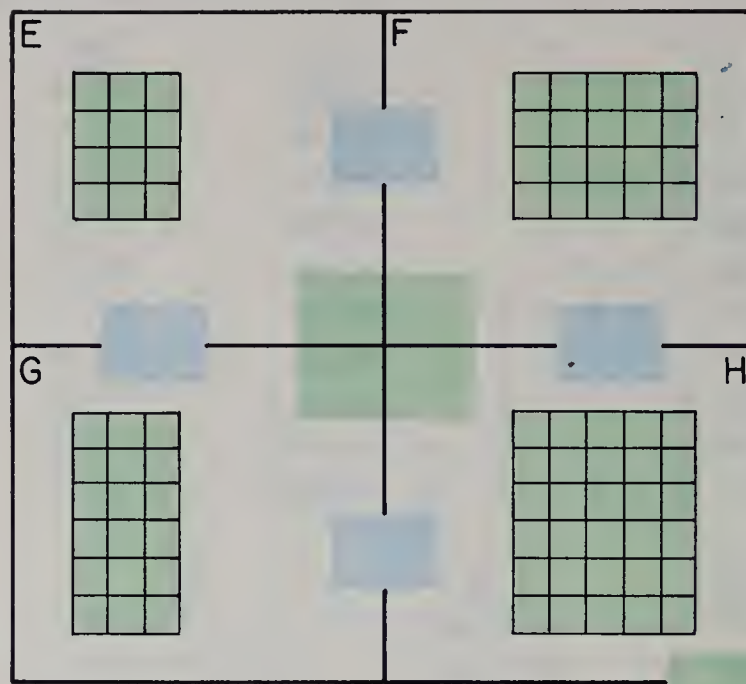
-5

-10

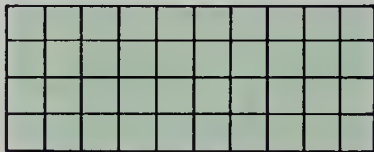
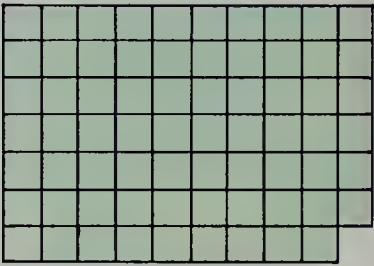
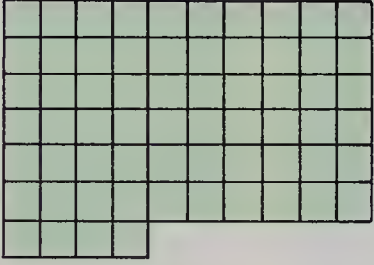
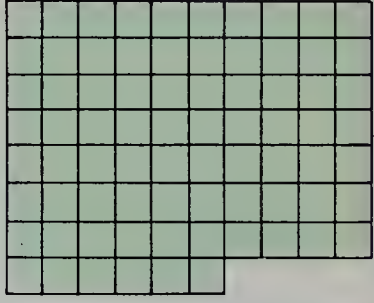
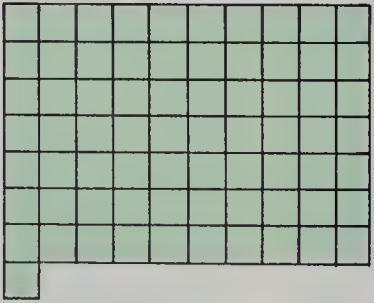
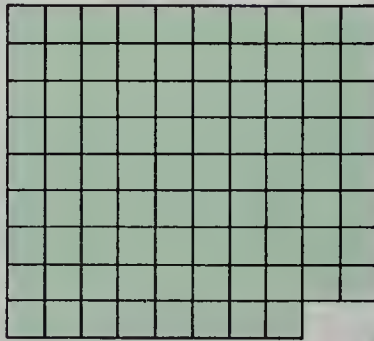
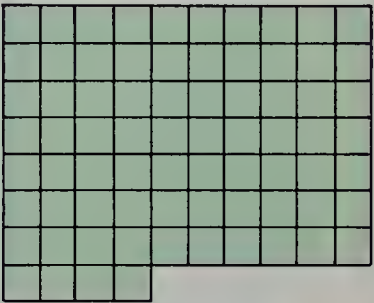
8

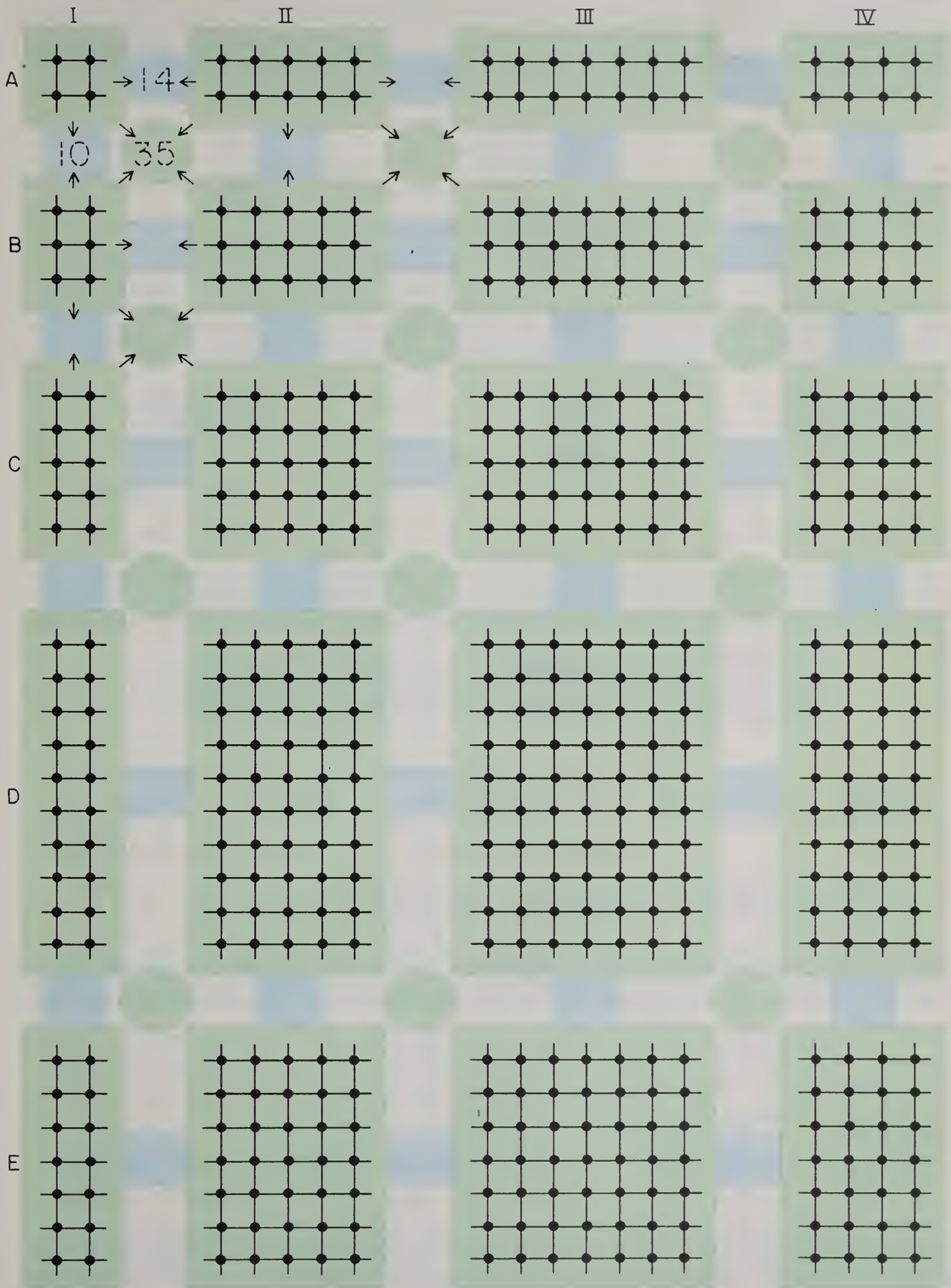


Total



	I	II	III	IV	V
A	10 6 30				
B					
	10				
C					
	16				
D					

A  40	B  66	C  40
D  22	E  48	F  40
G  8	H  40	I  40
J  40	K  40	L  40
M  40	N  40	O  40

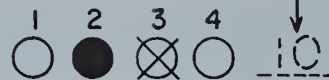


$$\begin{array}{r} 15 \\ + 5 \\ \hline \end{array}$$

- (1) 16 (2) 20 (3) 10 (4) 25

Mark the
correct
answer.

Mark the furthest from the
correct answer.



Difference between the answers
you marked.

$$\begin{array}{r} 34 \\ + 11 \\ \hline \end{array}$$

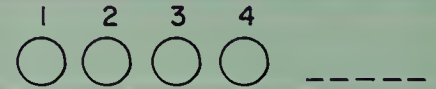
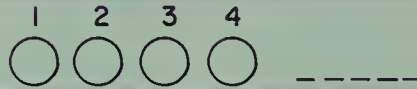
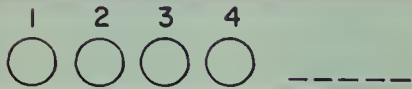
- (1) 35
(2) 44
(3) 45
(4) 41

$$28 + 37 =$$

- (1) 55 (3) 57
(2) 58 (4) 65

$$\begin{array}{r} 47 \\ - 38 \\ \hline \end{array}$$

- (1) 9
(2) 19
(3) 85
(4) 75



$$200 + 375 =$$

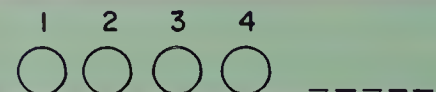
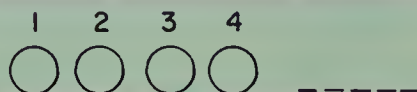
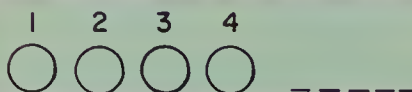
- (1) 175 (3) 500
(2) 575 (4) 695

$$\begin{array}{r} 736 \\ + 264 \\ \hline \end{array}$$

- (1) 990
(2) 900
(3) 1000
(4) 532

$$193 - 90 =$$

- (1) 103 (3) 183
(2) 283 (4) 100



TOY SALE

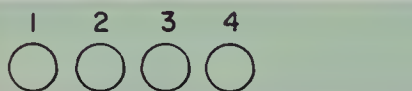
Models
14¢ each

Puzzles
18¢ ea.

Games
27¢ ea.

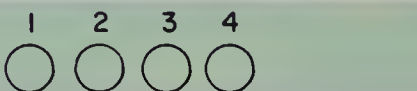
How much did Tony pay
for a model and a puzzle?

- (1) 22¢ (3) 45¢
(2) 32¢ (4) 41¢



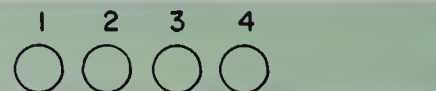
Shirley bought a puzzle
and a game and gave the
clerk \$1.00. How much
change should she get?

- (1) 45¢ (3) 55¢
(2) \$1.45 (4) \$1.55



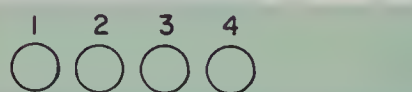
Paul bought a model, a
puzzle, and a game. He gave
the clerk a dollar. How
much change should he get?

- (1) 51¢ (3) 49¢
(2) 59¢ (4) 41¢



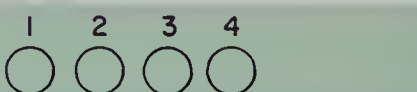
Paula bought a puzzle and
a game. Betty bought a
model and a puzzle. How
much more did Paula spend
than Betty?

- (1) 13¢ (3) 45¢
(2) 32¢ (4) 77¢



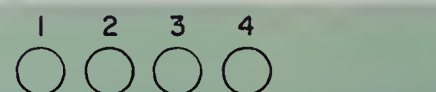
Lester bought two puzzles
and two models. He gave
the clerk a dollar. How much
change should he get?

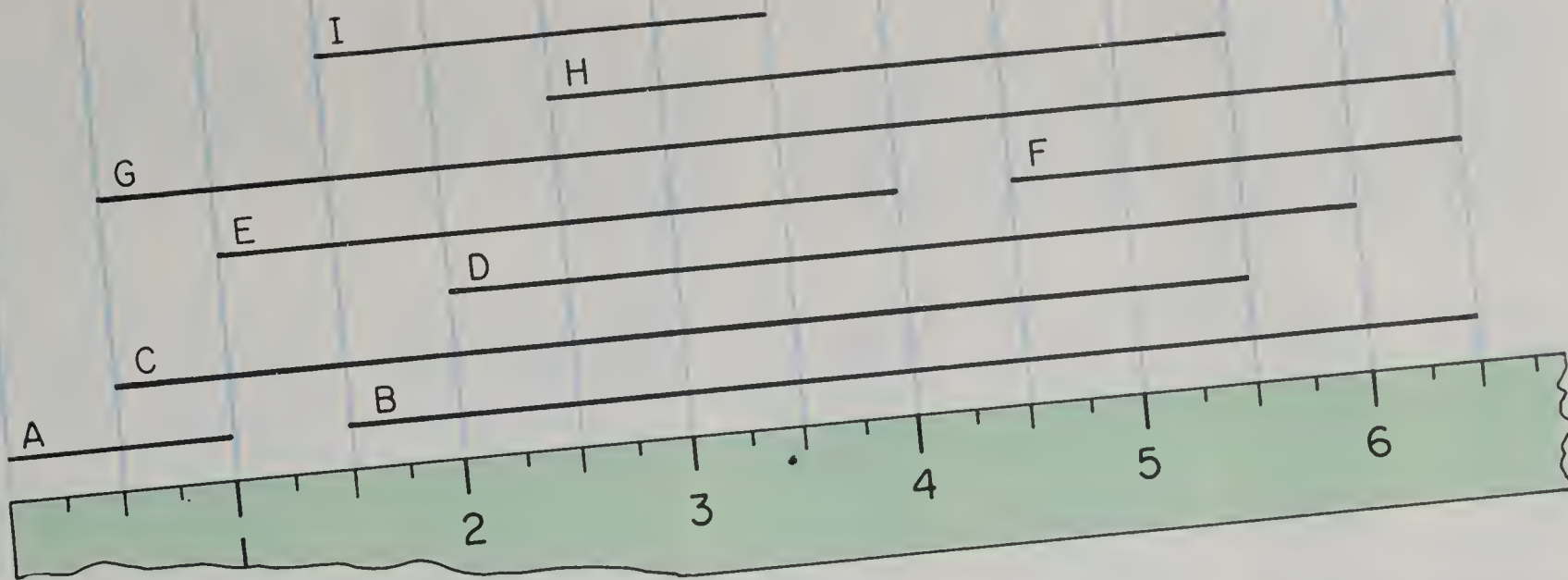
- (1) 64¢ (3) 40¢
(2) 54¢ (4) 36¢



Mona bought two games,
two puzzles, and three
models. How much did she
spend?

- (1) \$1.32 (3) \$1.18
(2) \$1.22 (4) 98¢





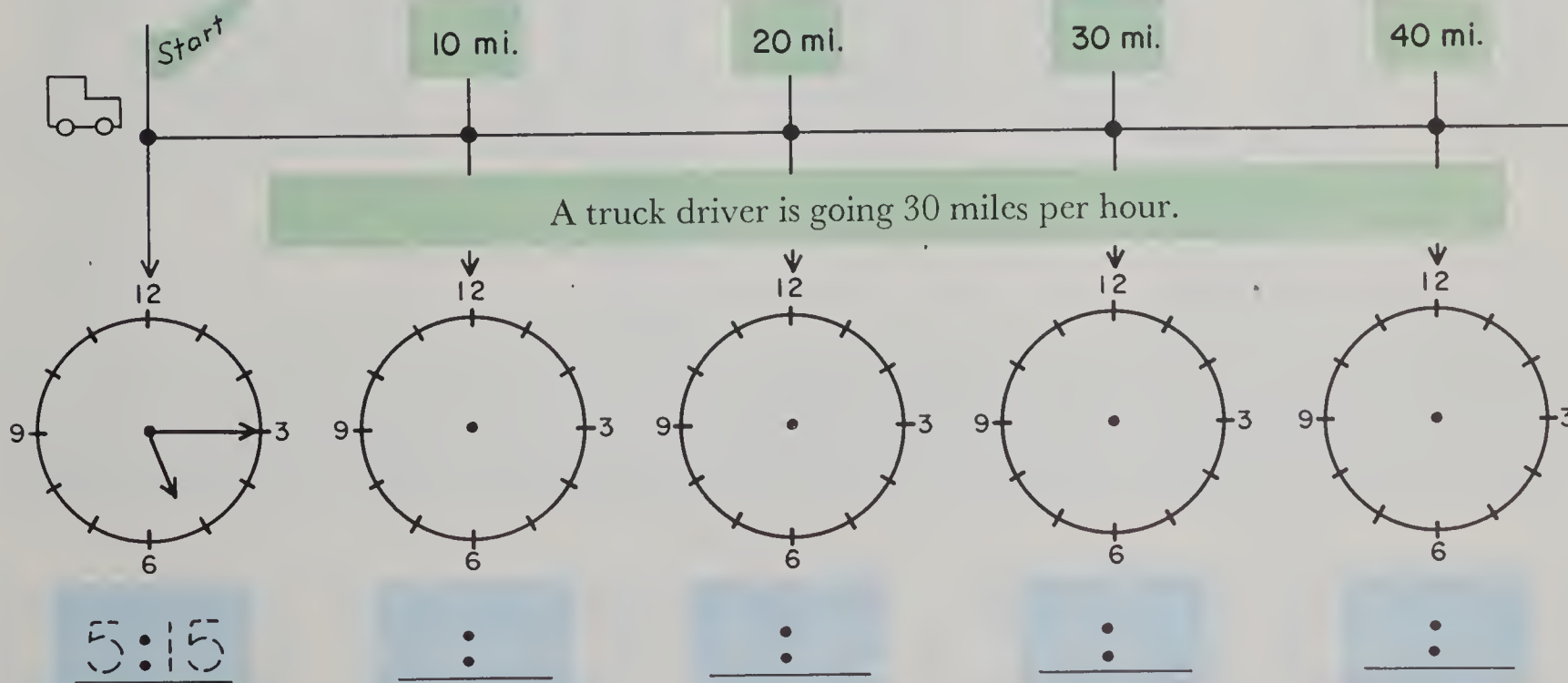
Lengths:

A: _____ inch C: _____ in. E: _____ in. G: _____ in.
 B: _____ inches D: _____ in. F: _____ in. H: _____ in.
 I: _____ in.

SUMS of lengths:

DIFFERENCES of lengths:

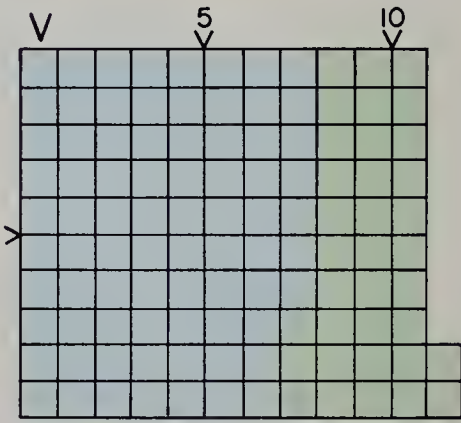
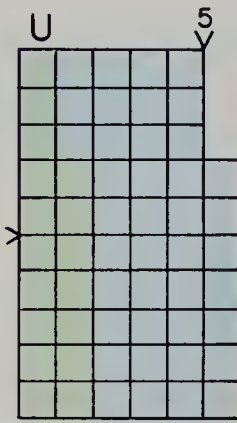
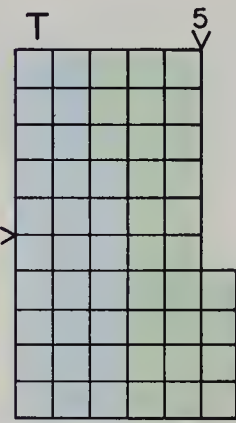
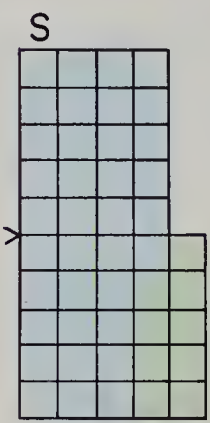
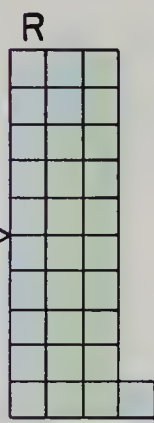
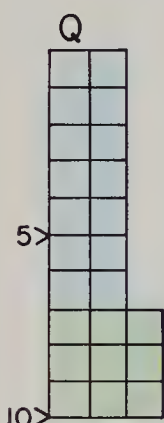
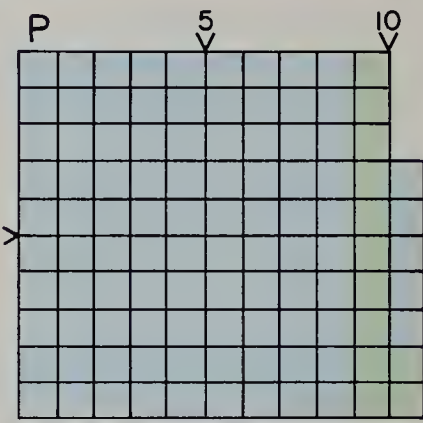
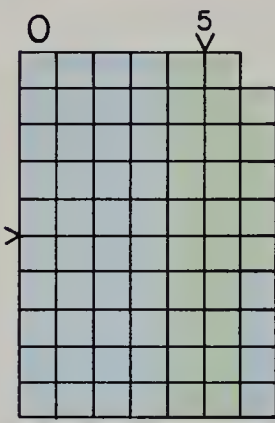
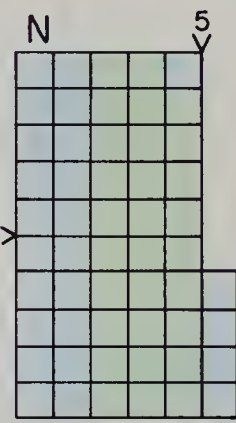
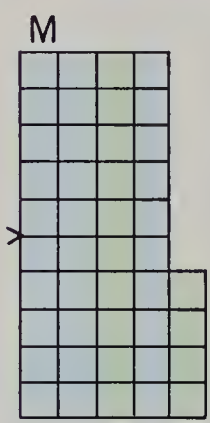
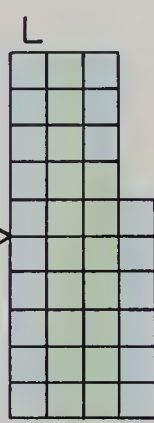
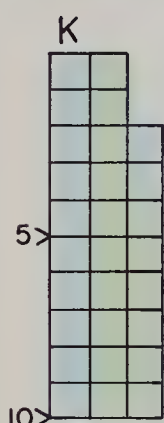
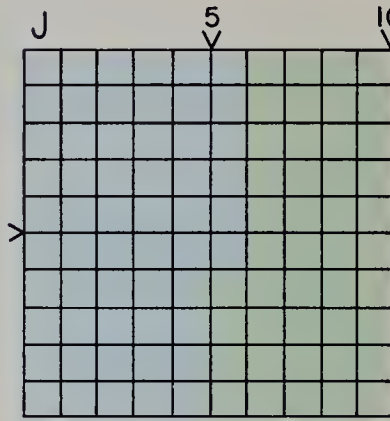
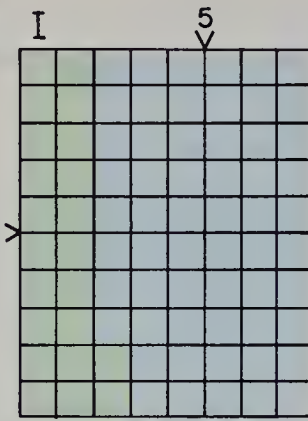
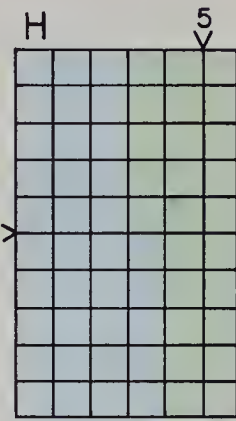
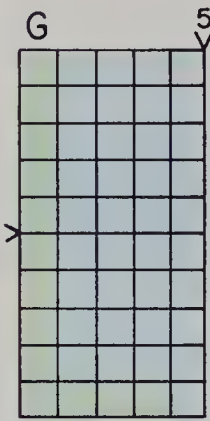
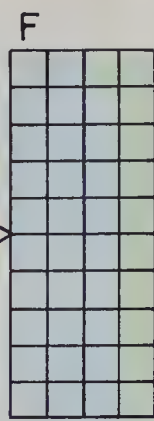
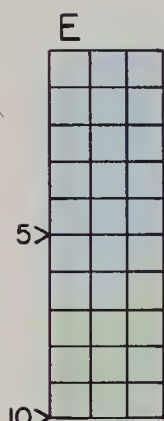
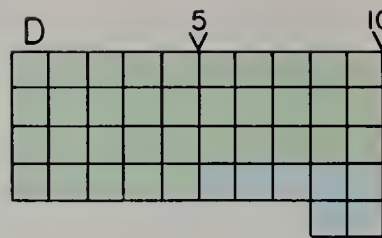
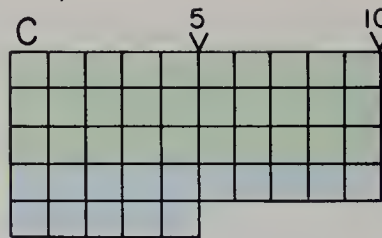
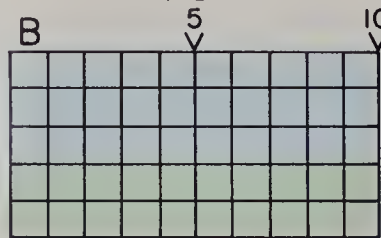
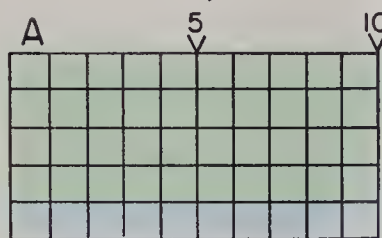
A and E: _____ in.	A, I, and F: _____ in.	E and F: _____ in.	H and I: _____ in.
G and C: _____ in.	B, D, and G: _____ in.	G and D: _____ in.	D and A: _____ in.
B and H: _____ in.	C, H, and A: _____ in.	B and A: _____ in.	G and F: _____ in.
D and F: _____ in.	D, H, and B: _____ in.	F and I: _____ in.	D and I: _____ in.



He would travel:

_____ miles in 2 hrs.; _____ miles in 1½ hrs.; _____ miles in 5 hrs.

How many tiles in all? How many green? How many blue?



	A	B	C	D	E	F	G	H	I	J	K
Total	50	.									
Green	40										
Blue	10	30									

	L	M	N	O	P	Q	R	S	T	U	V
Total											
Green											
Blue											

A

FRONT	BACK	
35	30	5
14	10	4
	21	49

B

FRONT	BACK	
47		7
10	10	0
	37	

C

FRONT	BACK	
80	80	0
60		0
		140

D

FRONT	BACK	
34	20	14
17		7

E

FRONT	BACK	
50		10
36	30	

F

FRONT	BACK	
81		1
31		

G

FRONT	BACK	
45		
11		

H

FRONT	BACK	
30		
	10	3

I

FRONT	BACK	
	30	16
38		

J

FRONT	BACK	
76		
51		

K

FRONT	BACK	
82		
29		

L

FRONT	BACK	
	30	10
	10	4

M

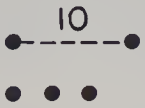
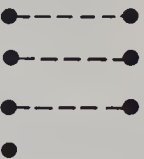
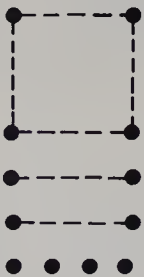
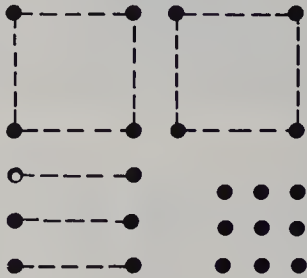
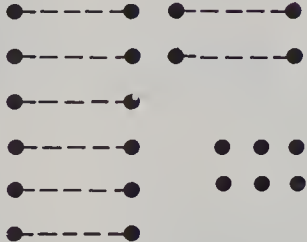
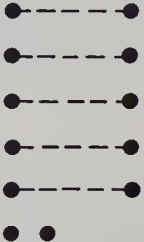
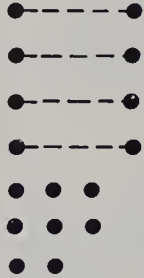
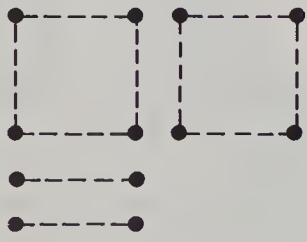
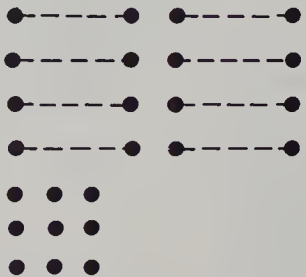
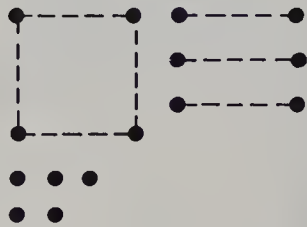
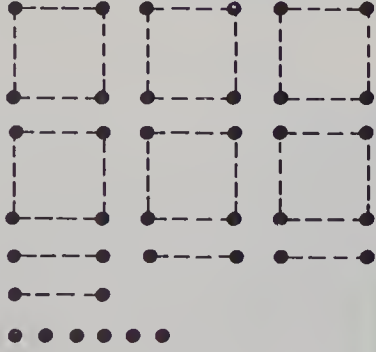
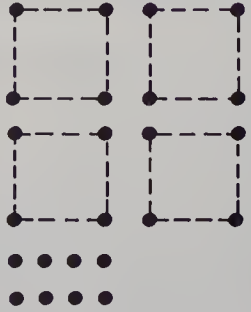
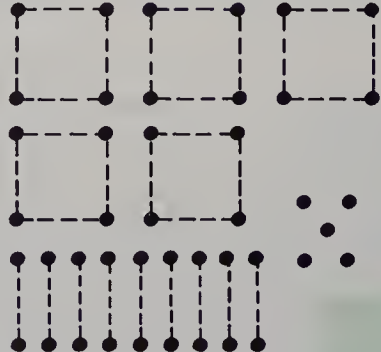
FRONT	BACK	
		2
	90	
	0	

N

FRONT	BACK	
	20	
		8
	17	

O

FRONT	BACK	
		11
	10	
		33

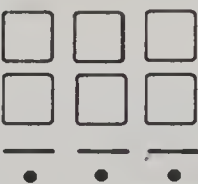
A  10	B 	C 
D 	E 	F 
G 	H 	I 
J 	K 	L 
M 	N 	O 

A  **B** 

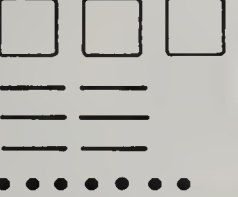
C  **D** 

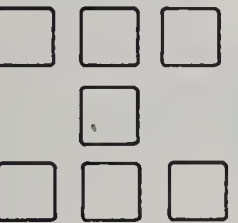
26	
20	6
100	139

E  **F** 

G  **H** 

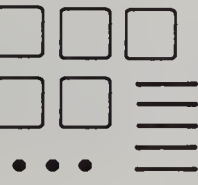
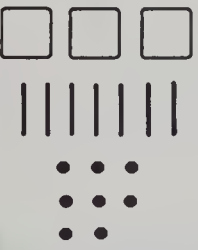
70

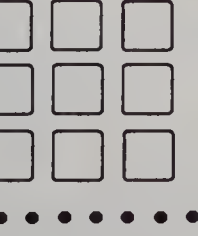
I  **J** 

K  **L** 

M  **N** 

O  **P** 

Q  **R** 

S  **T** 

U **V**

123	275
409	386

W **X**

What Are My Rules?

A chain reaction — to the right.

a. $\rightarrow$

10	+5	15	-2	13
----	----	----	----	----

b. $\rightarrow$

13	+4	17	+3	20
----	----	----	----	----

c. $\rightarrow$

17	-7	10	-4	6	+10	16
----	----	----	----	---	-----	----

d. $\rightarrow$

11	-4	7	+3	10
----	----	---	----	----

e.

9		11	+4	
---	--	----	----	--

f.

3	+10		+5			20	-5			25
---	-----	--	----	--	--	----	----	--	--	----

A chain reaction — down.

A chain reaction — down to the right.

g. $\downarrow$

18
+4
22
+10

h. $\downarrow$

30
+20
40

i. $\downarrow$

-7
-9
8

k. $\rightarrow$

20

j. $\rightarrow$

25

l. $\rightarrow$

15

-3

-6

17

+5

20

A chain reaction — 3 ways!

m. $\downarrow$ $\rightarrow$ $\downarrow$ $\downarrow$

$\rightarrow$

20	-4	16	+3	
-8	-14	-10		
12				29

n. $\downarrow$ $\rightarrow$ $\downarrow$ $\downarrow$

$\rightarrow$

15		20	+8	
-5		+5		+7
	+15			

o. $\downarrow$ $\rightarrow$ $\downarrow$ $\downarrow$

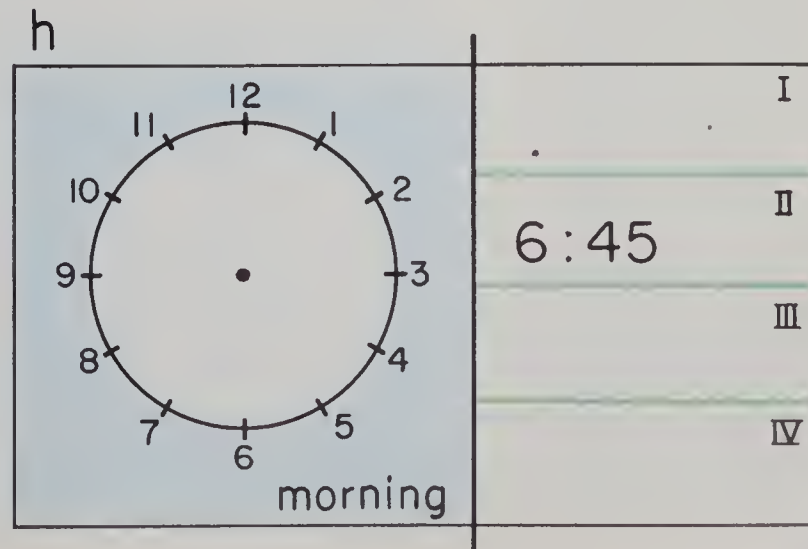
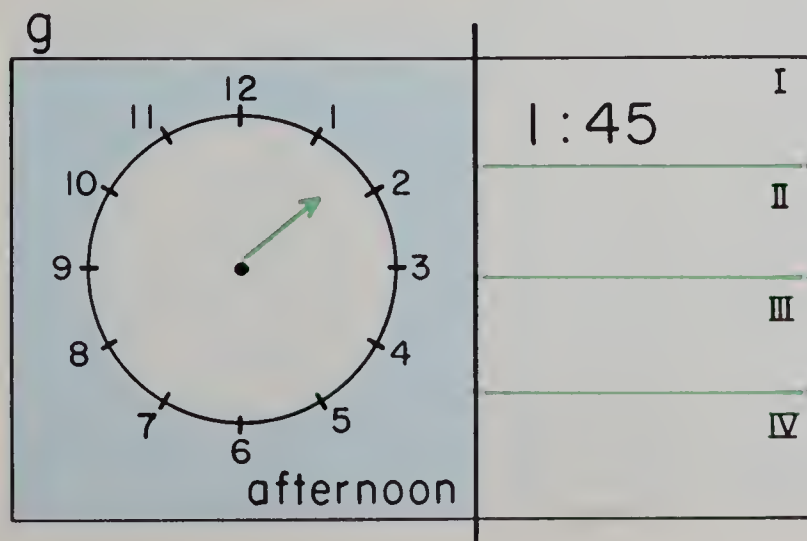
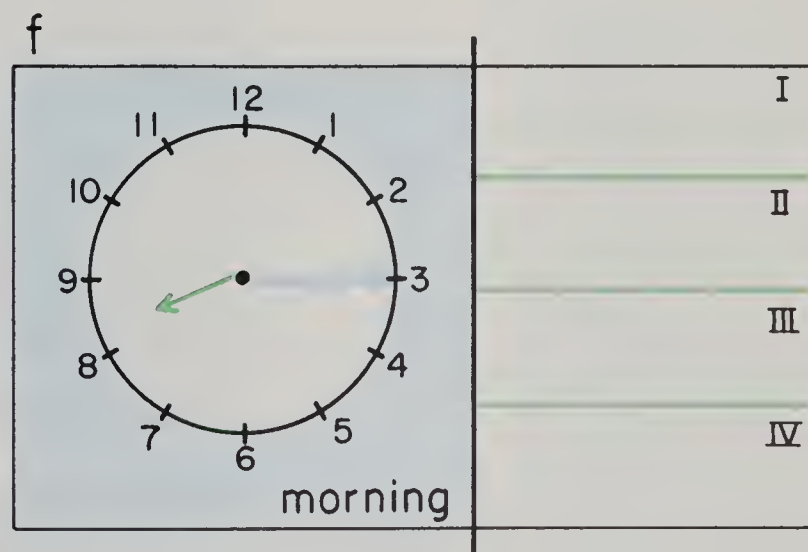
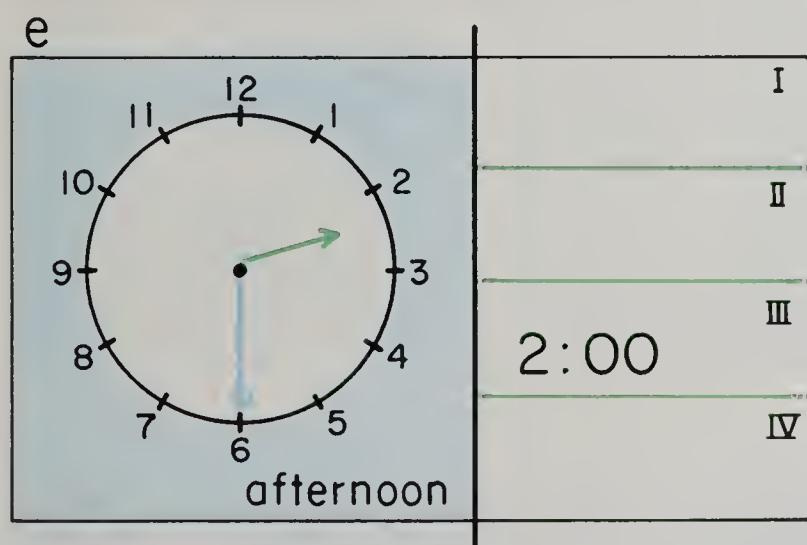
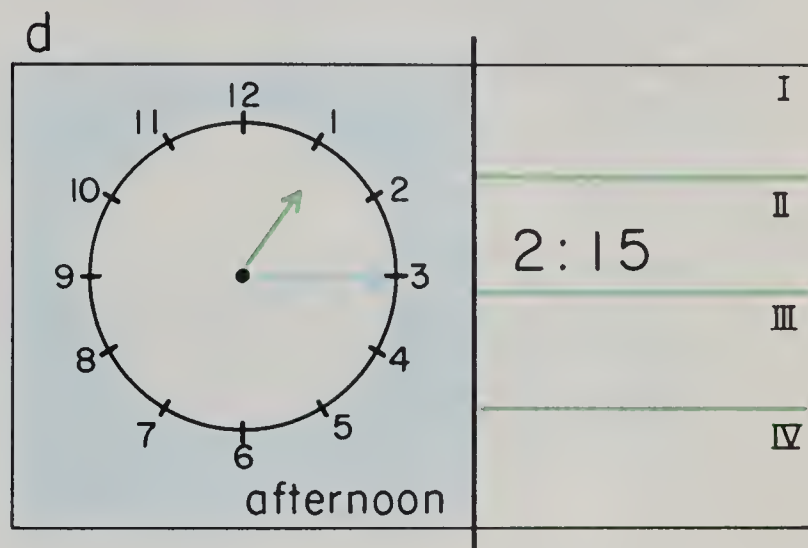
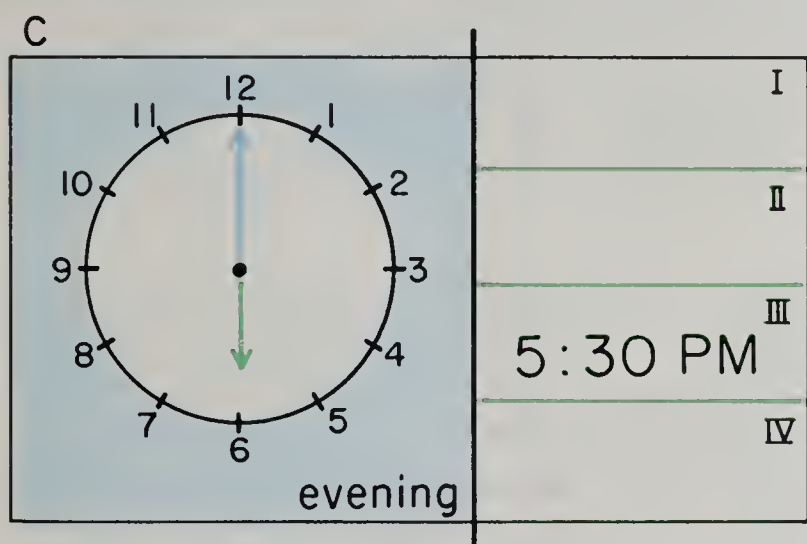
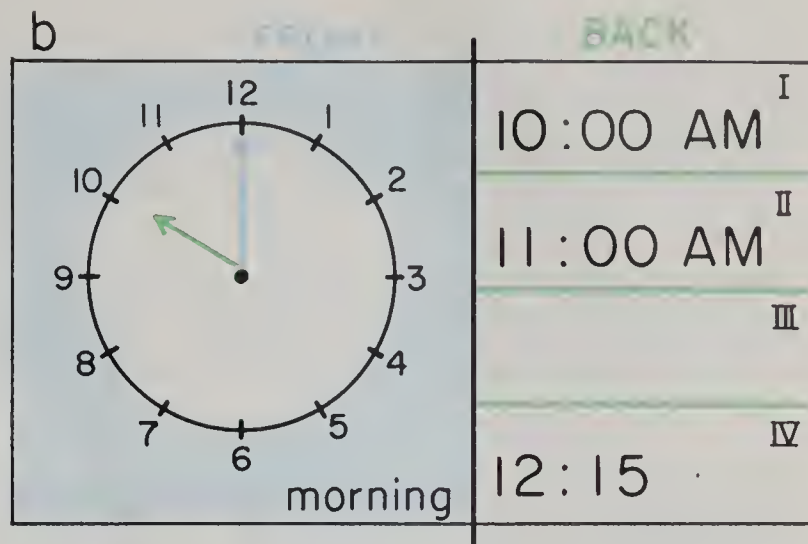
$\rightarrow$

30	-10			
-5		-5		-5
	-10			5
			-14	
21		11		

p. $\downarrow$ $\rightarrow$ $\downarrow$ $\downarrow$

$\rightarrow$

12	+10		+9	
	+18			
	+9			41
	+2		+0	
	+9			



3-Way Chain Reactions

a. ↓

→ 8	+7	15	-2	13
+5				
→	+10		+10	

b. ↓

→ 15	+10		+7	
+5	+25			+20
	+20			

c. ↓

→ 18			+8	
+5	+15	+6		+10
→				

d. ↓

→ 25		27		47
			+15	
→	+8	43	-1	
		+8		+20
	+10			

Helen bought 2 things from the school supplies listed. They were all different. What can you say?

School Supplies

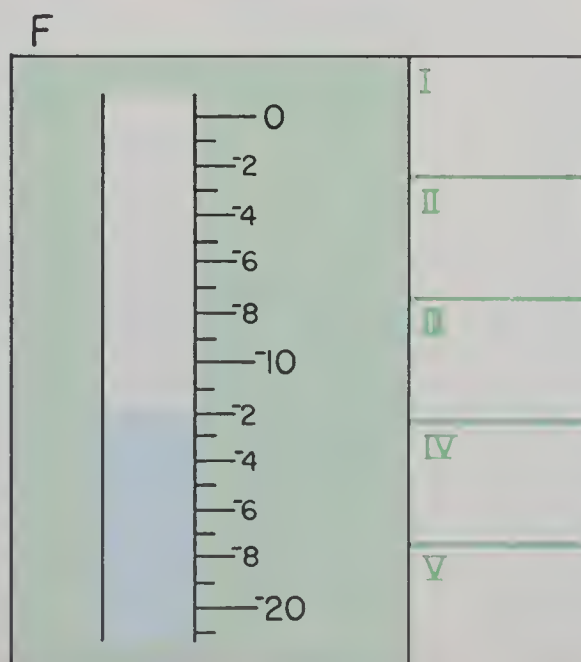
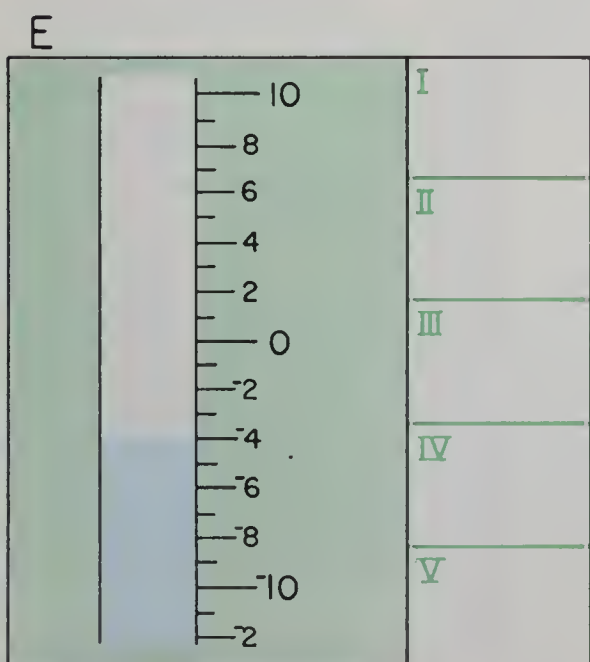
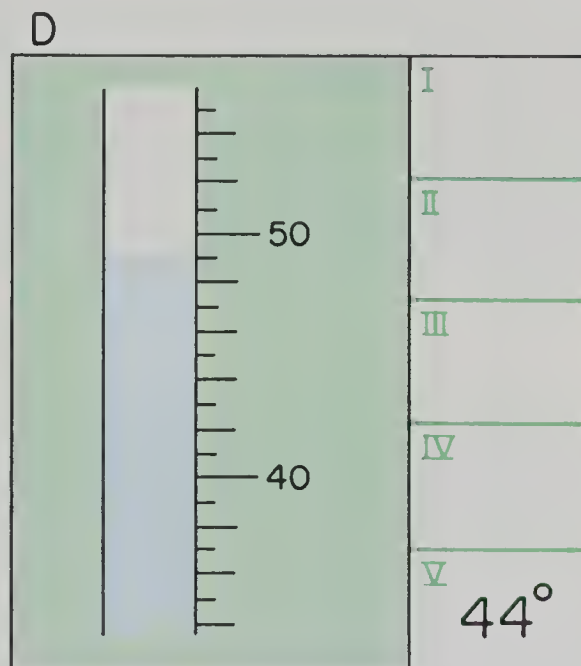
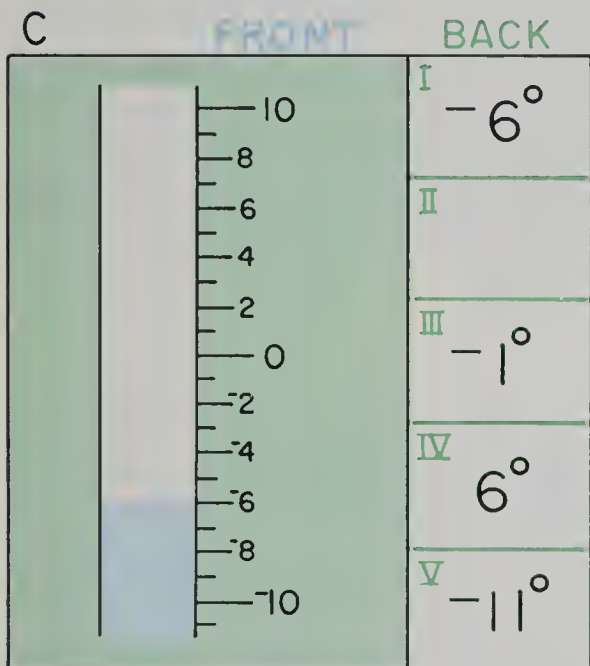
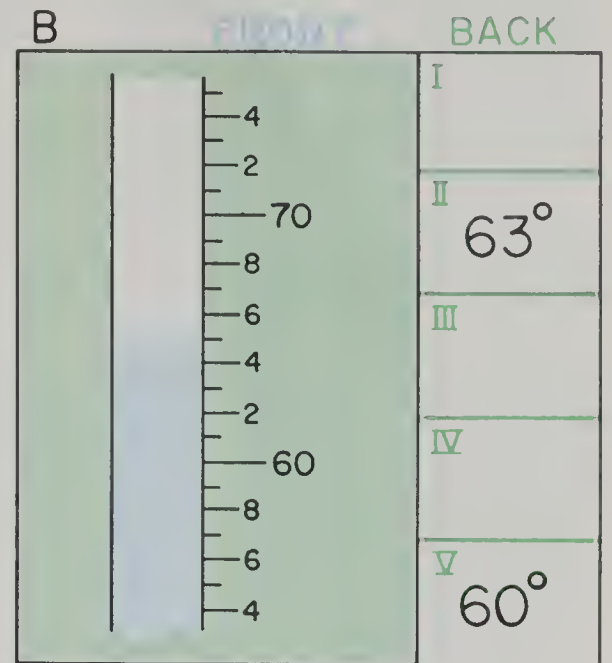
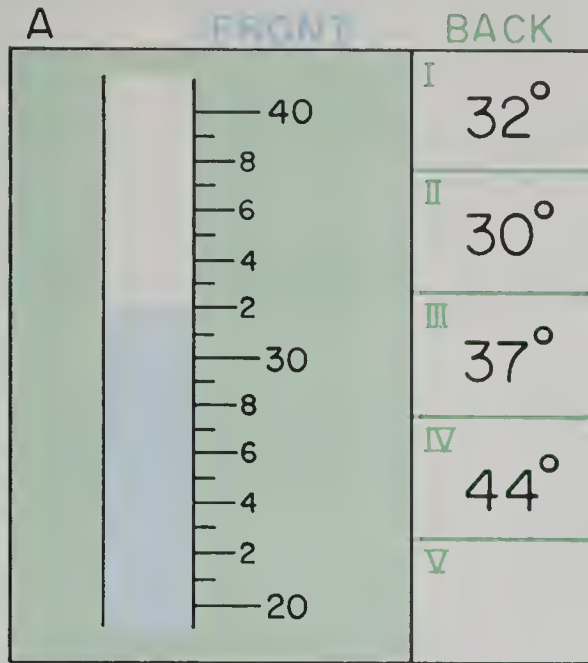
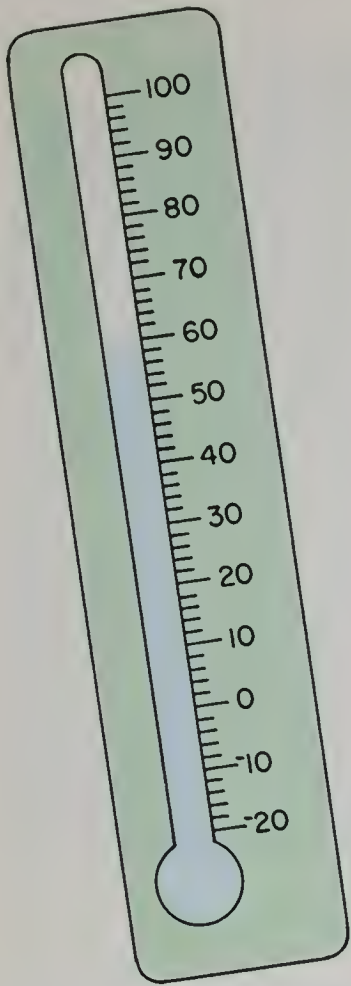
Paper.....	8¢
Crayons.....	15¢
Paints.....	18¢
Notebook.....	25¢
Pencil Box.....	27¢

If she bought crayons and a notebook then she spent ____¢.

If she bought paper and crayons then she spent ____¢.

Use the chart below to explore the purchases of 2 different items Helen might have made.

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
Paper — 8¢	I	I									
Crayons — 15¢	I	O									
Paints — 18¢	O	I									
Notebooks — 25¢	O	O									
Pencil Box — 27¢	O	O									
Total of purchases	23¢	¢	¢	¢	¢	¢	¢	¢	¢	¢	¢



Extra -

Another game
of
What's
My
Rule?

5	10
7	14
10	
	30
	24
0	
25	
	100
m	2m

A

		+ 45
		114
		+ 120
	+ 171	
172		246

B

		+ 49
		+ 100
		205
+ 225		
	360	436

C

		+ 35
		86
		105
+ 92	+ 117	
		180

D

	twice as much		enough more to make \$5.00	
	half as much		nine dimes more	
	a half-dollar less		nine dimes less	

E Shorthand

	twice as many		enough more to make 250	
	half as many		seventy-six more	
	one hundred thirty-seven less		seventy-seven less	

F Milk

twice as much
_____ gal., _____ qts.
half as much
_____ qts., _____ pts.

G Butter

twice as much
_____ lbs., _____ oz.
half as much
_____ lbs., _____ oz.

H Eggs

twice as much
_____ doz., _____ eggs
half as much
_____ doz., _____ eggs

Alice had five silver coins, all alike, and each coin was less than a dollar. She spent some of this money. What can we say?

First, we know that she had either

5 nickels worth _____ ¢, or

5 dimes worth _____ ¢, or

5 quarters worth \$1.25 or _____ ¢, or

5 half-dollars worth \$2.50 or _____ ¢.

If Alice had 5 nickels	
and spent ¢	then she has ¢ left.
20	5
4	
10	
6	
15	
	16
	13
18	
7	
	25
	4
24	

If Alice had 5 dimes	
and spent ¢	then she has ¢ left.
20	30
10	
5	
2	
7	
	38
	31
9	
	0
41	
18	
	15

If Alice had 5 quarters	
and spent ¢	then she has ¢ left.
20	
100	
50	
15	
	10
	108
30	
	90
40	
53	
60	
	27

If Alice had 5 half-dollars	
and spent ¢	then she has ¢ left.
20	
200	
100	
50	
75	
	170
55	
150	
	199
242	
149	
125	

What Are My Rules?

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
17	30	22					36	15	24	0	$x + y$
10	25	13	14	26	50		31				x
7	5	9	6	8		7					y
3	20	4			30	13		1	0		$x - y$

A

..		-12	-20	+9
		30		
-9	÷	--		
	77	11	60	25

B

□		-10	+28	-50
		90		
+100	+			
	254	30	75	87

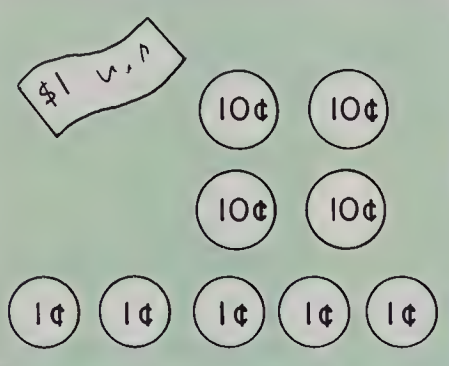
C

□ ...		-100	-20	-3
-50	-110	-33	-93	-25

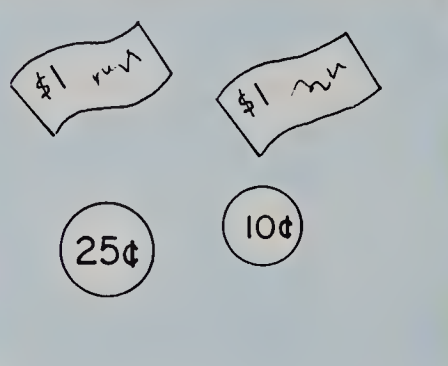
D

□ □		-50	+75	-140
	+308	-2	-24	-36
300				

E

		+10¢	-45¢
		\$1.55	
		-50¢	-16¢
÷	+25¢	-\$1.18	
\$2.00			50¢ \$2.50

F

		-35¢	-\$1.25
		+75¢	+90¢
-\$2.05	-50¢	-\$1.50	-57¢
			\$1.27

G

□ ::::	twice as many		three times as many	
	half as many		fifty less	

H

	twice as much		enough more to make \$5.00	
	half as much		nine dimes more	
	a half-dollar less		nine dimes less	

Draw a ring around the number that would make the sentence true.

$$3 \times 4 = 22 - \square$$

12 32 10 13

$$A \quad 2 \times \triangle = 9 + 7$$

11 27 15 8

$$B \quad \square + 3 = 5 \times 3$$

12 5 8 18

$$C \quad \triangle + 6 = 9 \times 3$$

27 21 17 54

$$D \quad 5 \times \bigcirc = 52 - 32$$

2 4 6 7

$$E \quad 4 \times 9 = \triangle \times 6$$

4 6 8 13

$$F \quad (3 \times \square) + 4 = 5 \times 5$$

7 3 25 9

$$G \quad \triangle \times 6 = 3 \times 8$$

1 2 3 4

$$H \quad (2 \times 9) + 3 = (\square \times 3) + 3$$

4 5 6 7

$$I \quad (4 \times \triangle) - 9 = (2 \times 8) - 9$$

4 5 6 11

$$J \quad 20 + 25 = \bigcirc \times 5$$

5 7 9 11

$$K \quad 7 \times 9 = \triangle \times 7$$

16 7 10 9

$$L \quad \square \times 15 = (5 \times 9) - 0$$

0 3 6 9

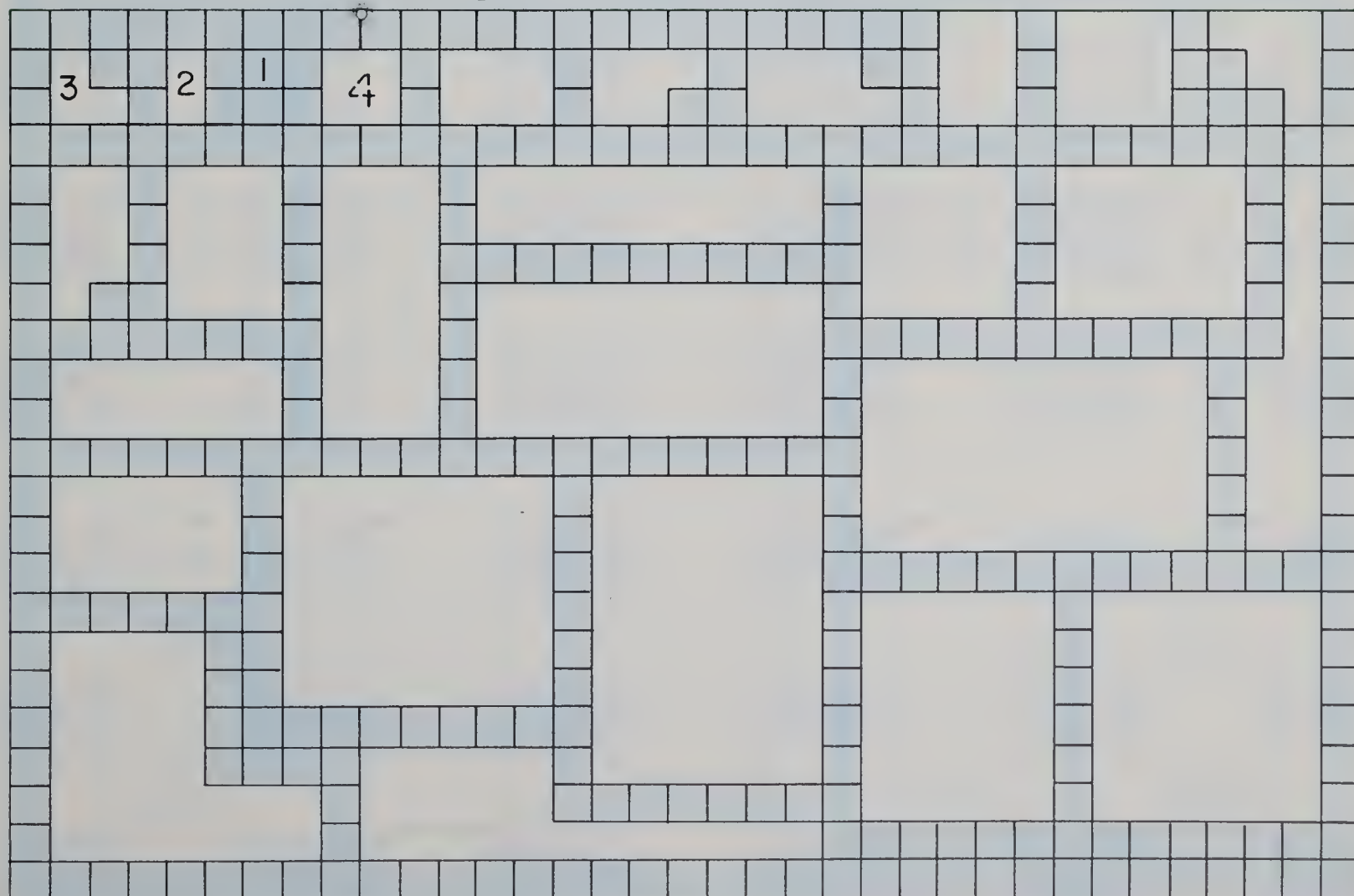
$$M \quad (\triangle \times 4) + 73 = (2 \times 10) + 73$$

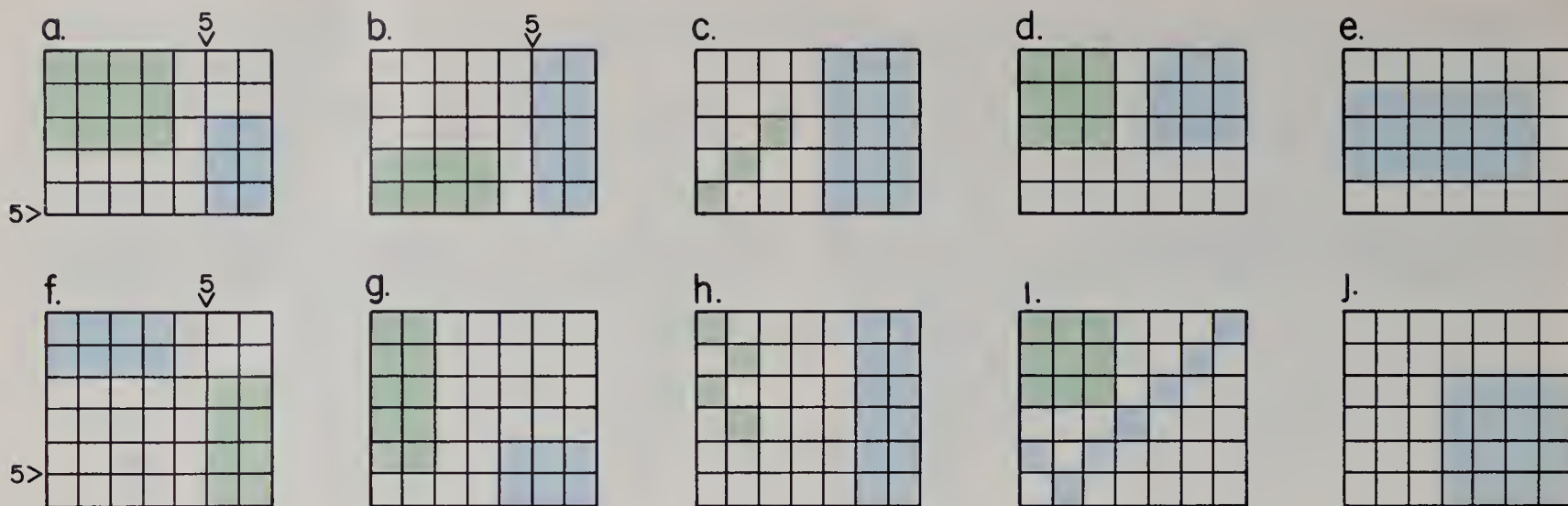
73 77 5 12

$$N \quad (3 \times 8) + 16 = 4 \times \bigcirc$$

4 5 7 10

Indicate the number of missing tiles.





	a	b	c	d	e	f	g	h	i	j
Total										
Green	12									
Blue	6									
Blue or green	18									
White	17									

3-way chain reactions

→ K ↓ ↓

→	35	-3	32
	-8	--18	--
→	27	--	

L

42		38
-10	-16	

M

35	-0	
	-18	
	-10	

→ N ↓ ↓ ↓ ↓ ↓ ↓ ↓

→	42	-7		-15		+12				
					-3				-8	
→	26	-0				+	25	+12		27

O

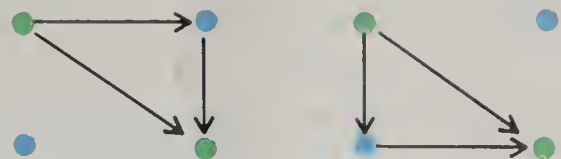
45			+3	
	-18	-10		
45				50
	+18		+23	
53				

P

			+20	
-6		-5	+17	
26		16		
			+86	
30		62		

More 3-way chain reactions.

Look for patterns.



A. ↓ ↓

→ 4	+1	5
+3	+6	+5
→ 7	+3	10

B. ↓ ↓

→ 12	-4	8
-5	-7	-3
→	-2	5

C.

7	+2	
-5	-4	-6
	+1	3

D.

12	-5	7
+2	+5	
14		17

E.

15	-2	
17	-12	

F.

20	-4	
-6		
		9

G. ↓ ↓ ↓

→ 13	+10		-10	
-4	+7	-3	-6	+4
→	+11		-3	

H.

20		17		
				+18
13		7	+12	

I. ↓ ↓ ↓

→ 12		22		42
→ 20		30		33
→ 25		10		3

J.

36	-20			21
	-18	+2		
	-10		+3	
-9			-7	
		9		

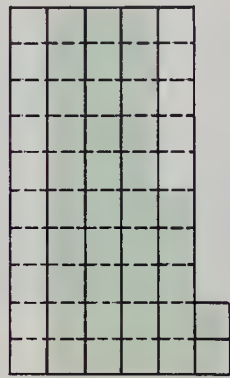
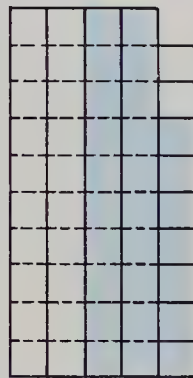
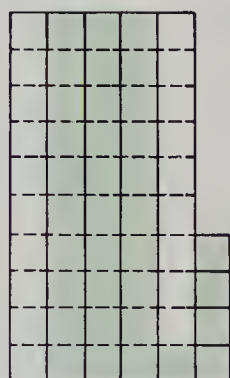
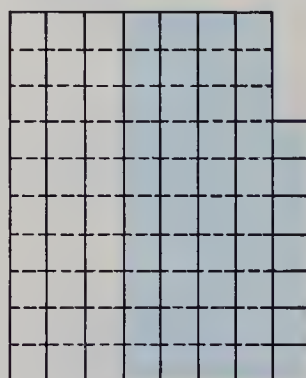
K.

	+8			47
		+10		
33		42		
				-30
	-13	22		21

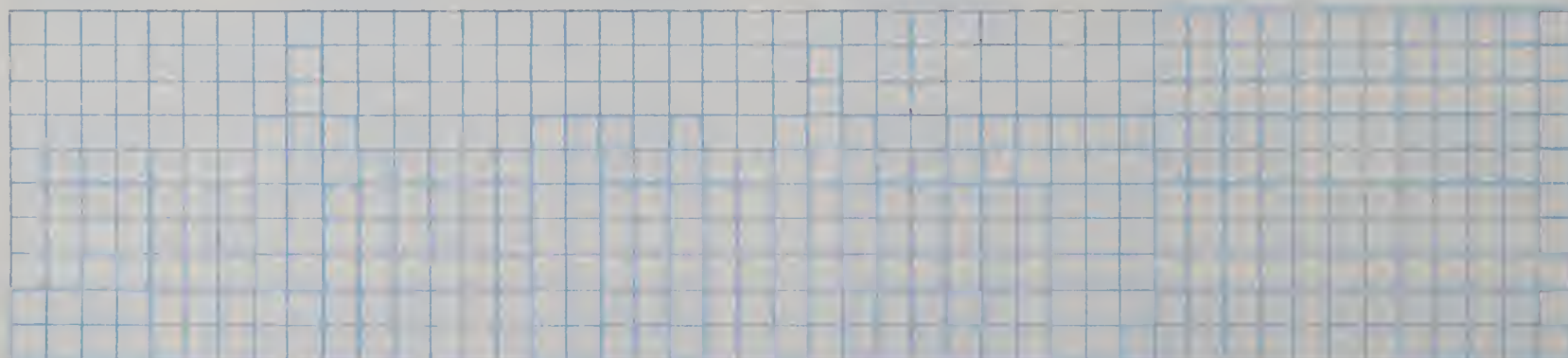
L.

3	+9			
		+9	+8	-4
	+15			
			+19	
	+8		+9	

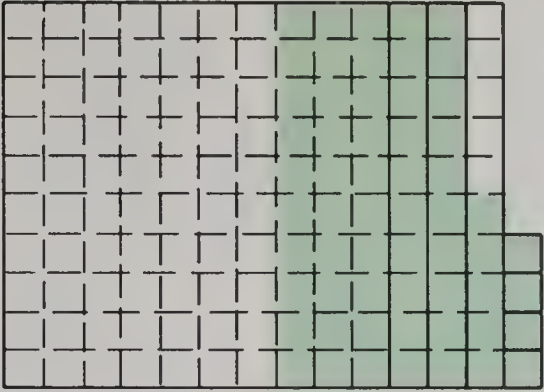
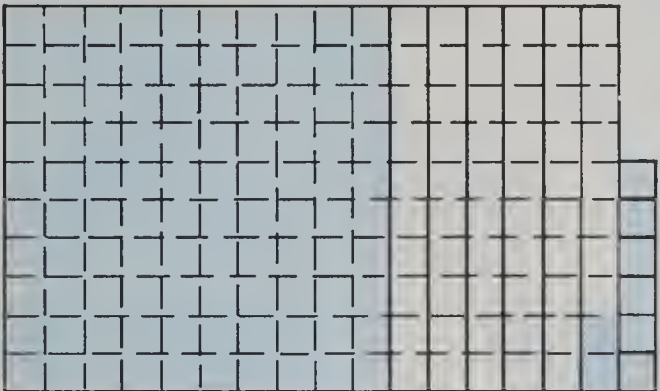
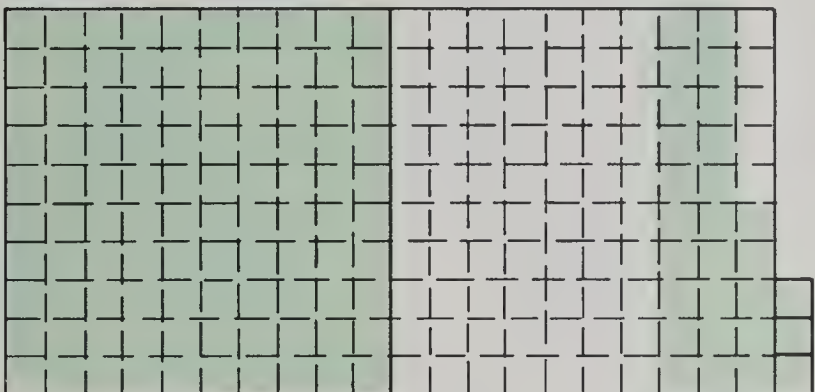
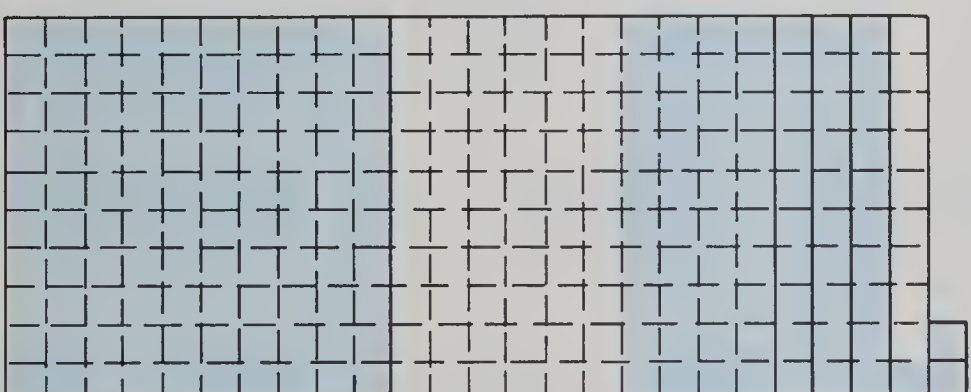
When in doubt, draw a sketch at the bottom of the page and COUNT.

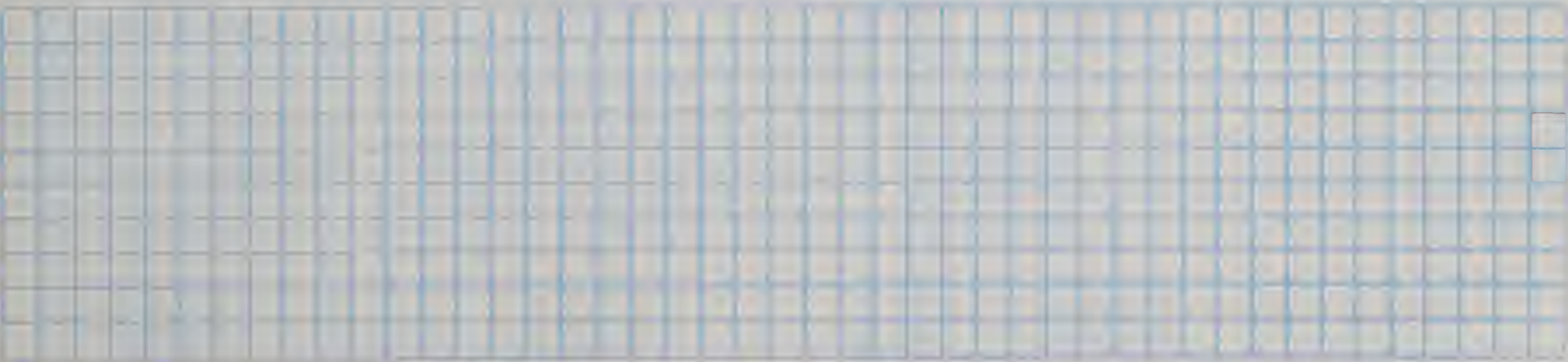
A		$\begin{array}{r} 33 \\ -15 \\ \hline \end{array}$	$\begin{array}{r} 33 \\ -10 \\ \hline \end{array}$	$\begin{array}{r} 33 \\ -3 \\ \hline \end{array}$	B		$\begin{array}{r} 28 \\ -14 \\ \hline \end{array}$	$\begin{array}{r} 28 \\ -18 \\ \hline \end{array}$	$\begin{array}{r} 28 \\ -9 \\ \hline \end{array}$
C		$\begin{array}{r} - \\ \hline \end{array}$	$\begin{array}{r} -22 \\ \hline \end{array}$	$\begin{array}{r} -9 \\ \hline \end{array}$	D		$\begin{array}{r} - \\ \hline \end{array}$	$\begin{array}{r} -25 \\ \hline \end{array}$	$\begin{array}{r} -8 \\ \hline \end{array}$
E		$\begin{array}{r} - \\ \hline \end{array}$	$\begin{array}{r} -29 \\ \hline \end{array}$	$\begin{array}{r} -10 \\ \hline \end{array}$	F		$\begin{array}{r} - \\ \hline \end{array}$	$\begin{array}{r} -48 \\ \hline \end{array}$	$\begin{array}{r} -13 \\ \hline \end{array}$
G		$\begin{array}{r} - \\ \hline \end{array}$	$\begin{array}{r} -42 \\ \hline \end{array}$	$\begin{array}{r} -8 \\ \hline \end{array}$	H		$\begin{array}{r} - \\ \hline \end{array}$	$\begin{array}{r} -30 \\ \hline \end{array}$	$\begin{array}{r} -19 \\ \hline \end{array}$
		$\begin{array}{r} -22 \\ \hline \end{array}$	$\begin{array}{r} -28 \\ \hline \end{array}$	$\begin{array}{r} -14 \\ \hline \end{array}$			$\begin{array}{r} -29 \\ \hline \end{array}$	$\begin{array}{r} -14 \\ \hline \end{array}$	$\begin{array}{r} -37 \\ \hline \end{array}$
		$\begin{array}{r} -16 \\ \hline \end{array}$	$\begin{array}{r} -29 \\ \hline \end{array}$	$\begin{array}{r} -47 \\ \hline \end{array}$			$\begin{array}{r} -58 \\ \hline \end{array}$	$\begin{array}{r} -16 \\ \hline \end{array}$	$\begin{array}{r} -28 \\ \hline \end{array}$

When in doubt, draw a sketch below and COUNT.



When in doubt, draw a sketch at the bottom of the page and COUNT.

I		$\begin{array}{r} 134 \\ - 59 \\ \hline \end{array}$	$\begin{array}{r} 134 \\ - 70 \\ \hline \end{array}$	$\begin{array}{r} - 17 \\ \hline \end{array}$	$\begin{array}{r} -104 \\ \hline \end{array}$	$\begin{array}{r} - 94 \\ \hline \end{array}$
		$\begin{array}{r} - 68 \\ \hline \end{array}$	$\begin{array}{r} - 86 \\ \hline \end{array}$	$\begin{array}{r} -109 \\ \hline \end{array}$	$\begin{array}{r} - 35 \\ \hline \end{array}$	$\begin{array}{r} - 57 \\ \hline \end{array}$
J		$\begin{array}{r} - \\ \hline \end{array}$	$\begin{array}{r} - 43 \\ \hline \end{array}$	$\begin{array}{r} - 75 \\ \hline \end{array}$	$\begin{array}{r} -129 \\ \hline \end{array}$	$\begin{array}{r} - 96 \\ \hline \end{array}$
		$\begin{array}{r} - 67 \\ \hline \end{array}$	$\begin{array}{r} - 18 \\ \hline \end{array}$	$\begin{array}{r} - 81 \\ \hline \end{array}$	$\begin{array}{r} - 87 \\ \hline \end{array}$	$\begin{array}{r} -148 \\ \hline \end{array}$
K		$\begin{array}{r} - \\ \hline \end{array}$	$\begin{array}{r} -200 \\ \hline \end{array}$	$\begin{array}{r} -160 \\ \hline \end{array}$	$\begin{array}{r} - 43 \\ \hline \end{array}$	
		$\begin{array}{r} - 85 \\ \hline \end{array}$	$\begin{array}{r} -109 \\ \hline \end{array}$	$\begin{array}{r} - 17 \\ \hline \end{array}$	$\begin{array}{r} - 56 \\ \hline \end{array}$	
L		$\begin{array}{r} - \\ \hline \end{array}$	$\begin{array}{r} - 90 \\ \hline \end{array}$	$\begin{array}{r} -115 \\ \hline \end{array}$		
		$\begin{array}{r} - 84 \\ \hline \end{array}$	$\begin{array}{r} -146 \\ \hline \end{array}$	$\begin{array}{r} -177 \\ \hline \end{array}$		

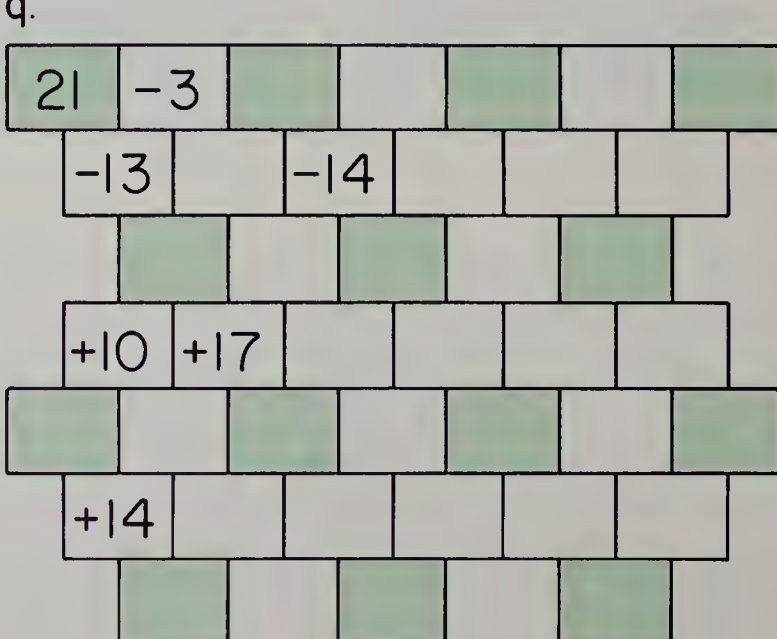
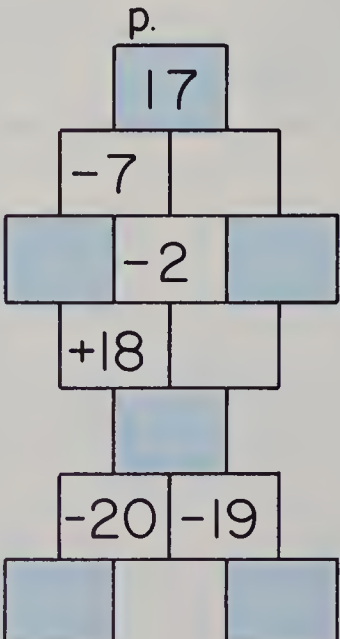
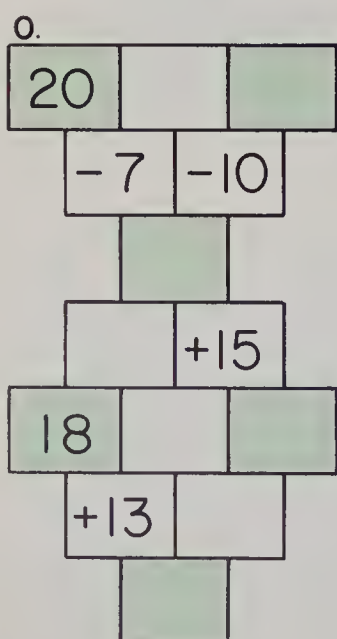
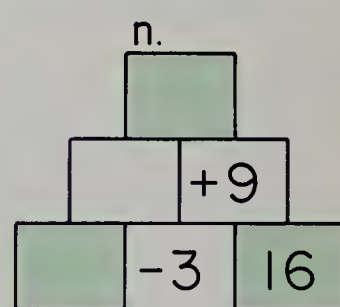
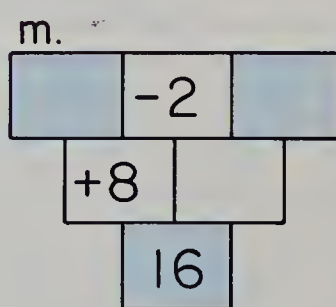
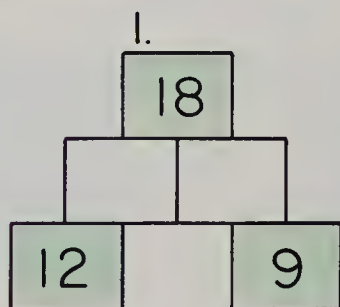
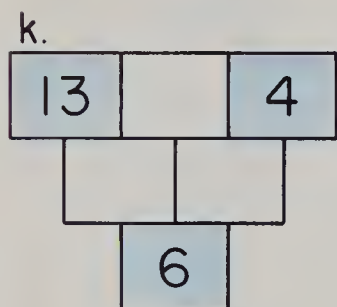
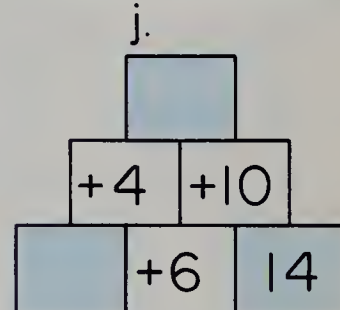
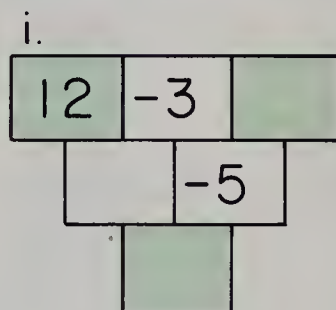
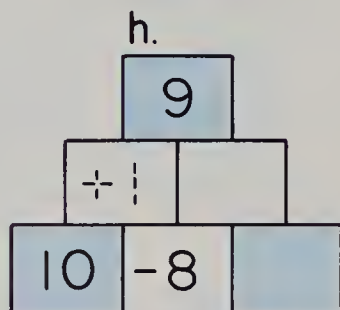
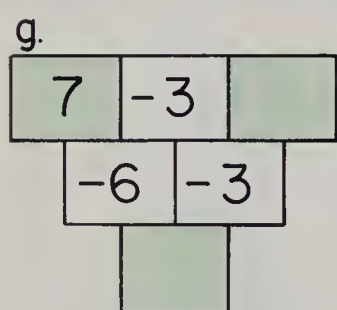
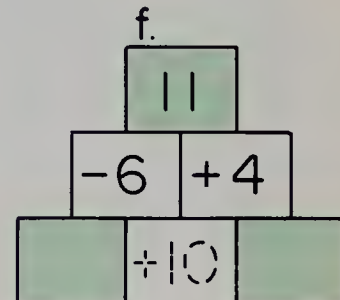
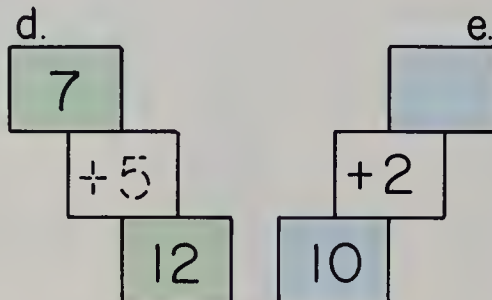
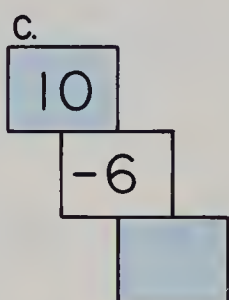
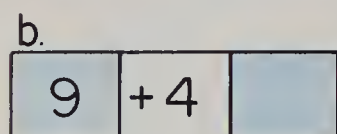
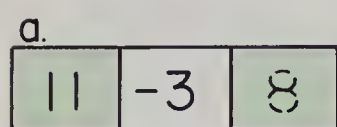
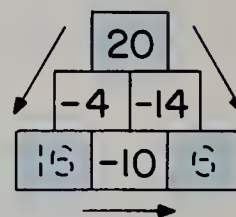
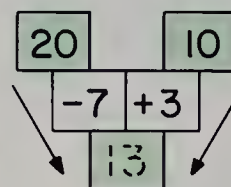
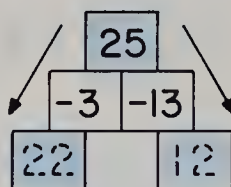
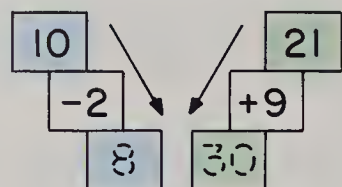
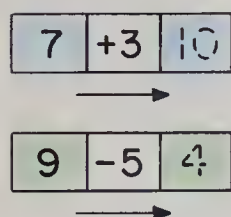
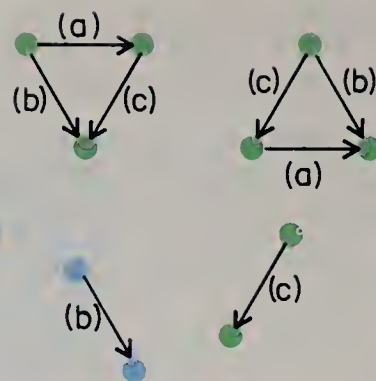


Here are some 3-way chain reactions with these ways of moving:

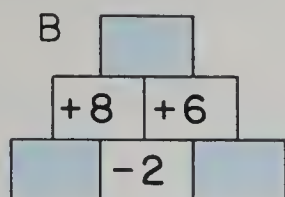
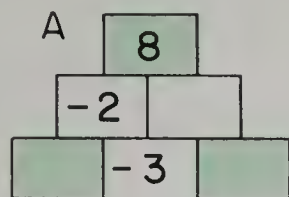
(a) left to right

(b) down and to the right

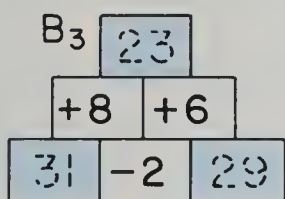
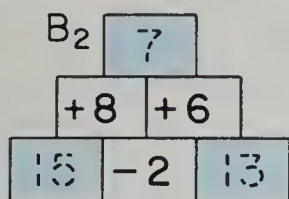
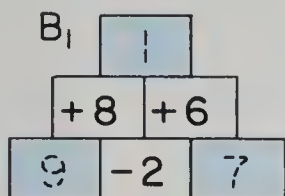
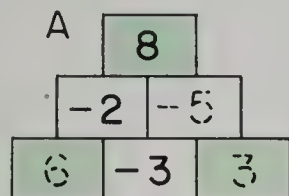
(c) down and to the left



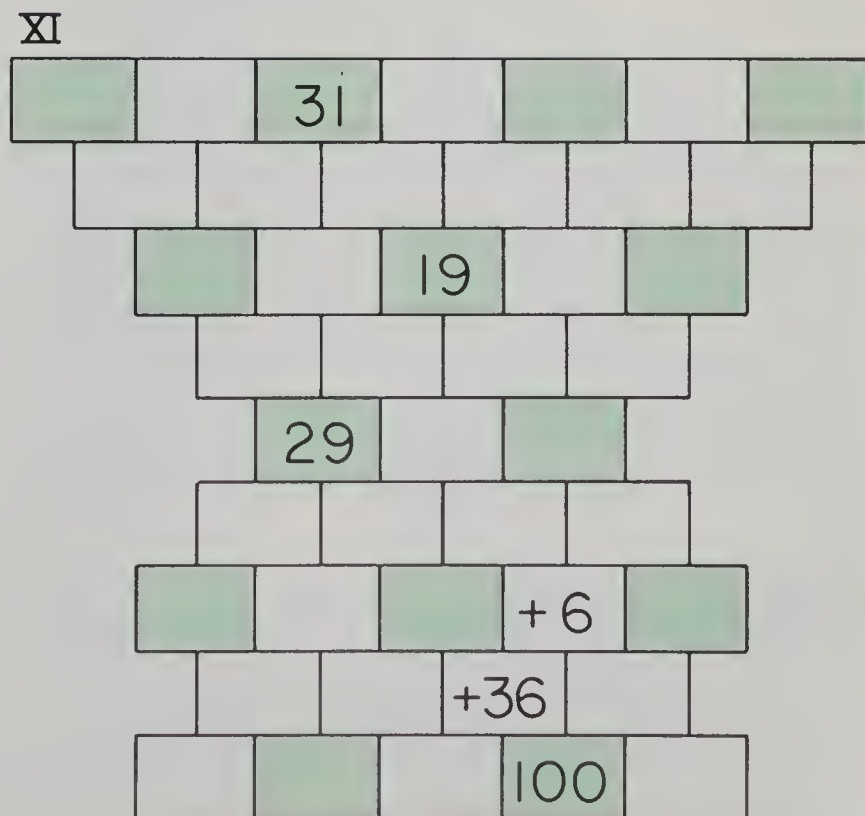
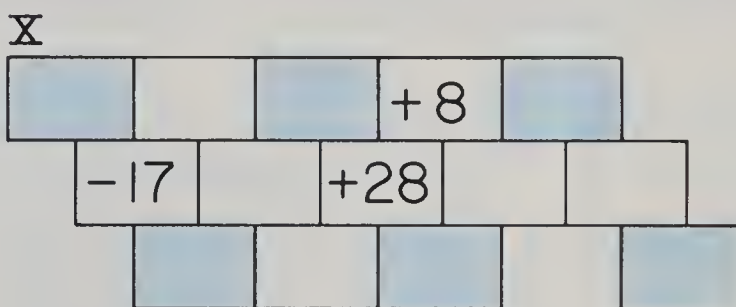
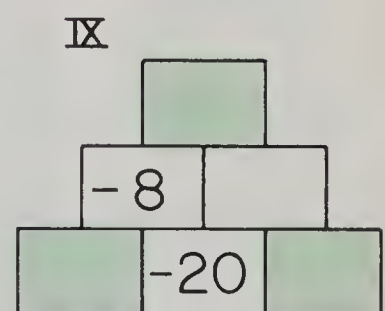
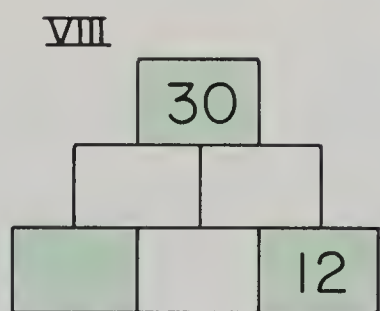
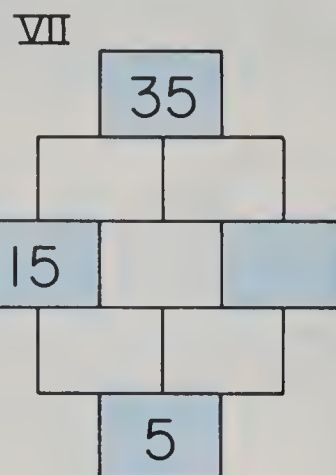
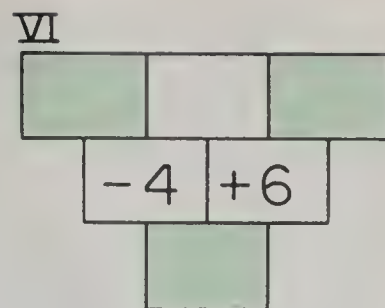
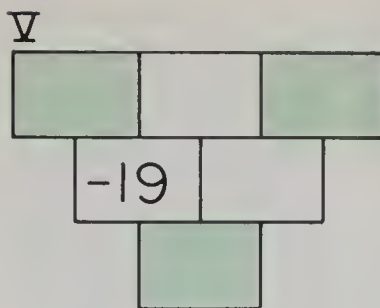
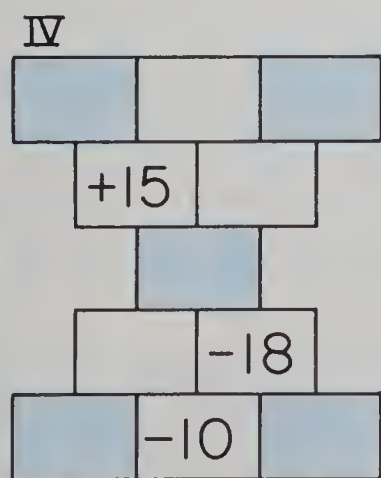
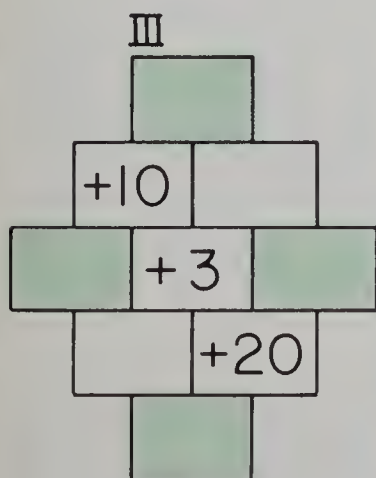
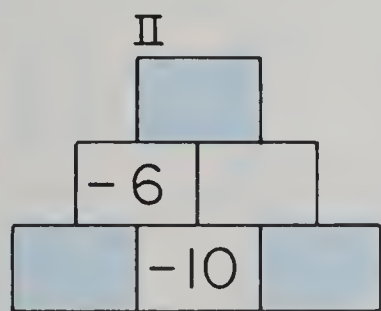
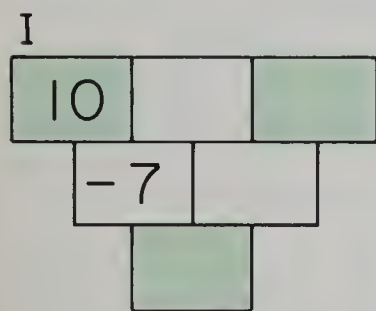
Look at the chain reactions in these two examples:



There is only one way to complete example A. But there are many ways to complete example B.

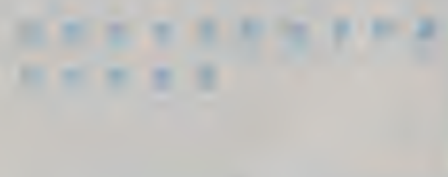


The chain reaction examples on this page are not like example A. They are like example B. Complete them in any way you like.

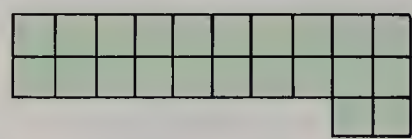


What Are My Rules?

A

			+ 6	- 6
+15	+ 9	- 9	+	--
			25	8

B

			- 3	+ 8
- 9	+		+19	
	40	6		51

C

		- 6
		+ 17
		- 15
50	31	24

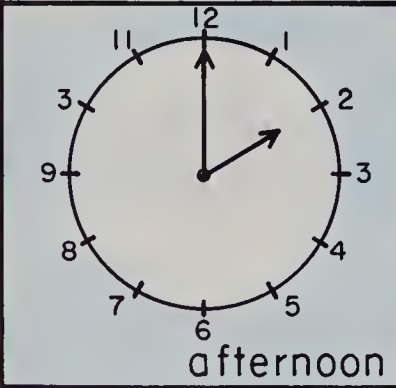
D

			- 25
			+ 8
			- 8
50	75	16	

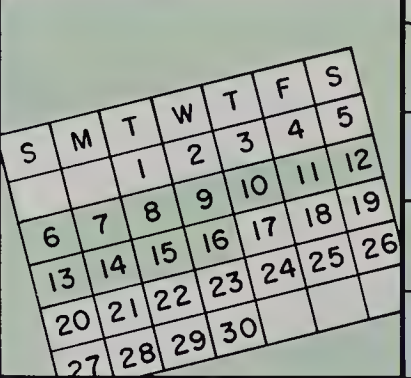
E

			+ 10¢
			¢
			- 7¢
			¢
			¢
			50¢
¢	¢	¢	
42¢	9¢	\$1.00	

F

	time shown
	: P.M.
	three hours later
	:
1 hour earlier	1 hr., 20 min. later
:	:
11 hours earlier	12 hours later
:	:

G

		weeks and days shaded green
		___ wk., ___ da.
		5 days more
		___ wks., ___ da.
5 days less		twice as many
___ wks., ___ da.		___ wks., ___ da.
1/2 as many		1 week, 6 days more
___ wks., ___ da.		___ wks., ___ da.

H

eight more				
22	35	71		
30			56	102

I

eight less				
29	35	20	110	
21				64

A.

			+ 19	
				91
- 9			- 17	+ 975
	101	7		

B.

			+ 70	- 21
+ 68		+ 166	- 15	
	206			133

C.

	plus thirty-four			86
		100	plus one hundred fourteen	

D.

	plus seventy-six cents			7 ¢
	minus sixteen cents		plus two dollars and three cents	
		\$ 9.25	minus twenty-five cents	

E.

plus 1 week, 4 days
3 weeks, 0 days
plus ___ weeks, ___ days
2 weeks, 1 day
plus 5 weeks, 6 days
___ weeks, ___ days
plus ___ weeks, ___ days
4 weeks, 2 days

F.

2 hours and 15 minutes later
:
1 hour and 35 minutes earlier
:
11:00 AM
6:05 PM

G.

plus 1 foot, 2 inches
___ feet, ___ inches
minus 9 inches
___ foot, ___ inch
plus 14 inches
___ feet, ___ inches
plus 22 inches
___ feet, ___ inches

FRONT BACK

9 | 1,2

CLUE:

MAY

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

4 | 0,4

7 | 1,0

14 | 2,0

8 | 1,1

11 | 1,4

0 | 0,0

21 | 3,0

a.

6 | 0,6

b.

13 |

c.

15 |

e.

10 |

f.

17 |

g.

| 2,2

d.

12 | 1,5

Please watch the signs!

h.

$$\begin{array}{r} 14 \\ + 7 \\ \hline 21 \end{array} \quad \begin{array}{r} 2,0 \\ 1,0 \\ \hline \end{array}$$

i.

$$\begin{array}{r} \\ - 14 \\ \hline 14 \end{array} \quad \begin{array}{r} 4,0 \\ 2,0 \\ \hline \end{array}$$

j.

$$\begin{array}{r} \\ + 9 \\ \hline \end{array} \quad \begin{array}{r} 2,5 \\ \hline \end{array}$$

k.

$$\begin{array}{r} \\ - \\ \hline 4 \end{array} \quad \begin{array}{r} 1,6 \\ \hline \end{array}$$

l.

$$\begin{array}{r} 4,4 \\ - 1,4 \\ \hline \end{array}$$

m.

$$\begin{array}{r} 2,5 \\ + 1,4 \\ \hline \end{array}$$

n.

$$\begin{array}{r} 4,0 \\ - 2,5 \\ \hline \end{array}$$

o.

$$\begin{array}{r} 4,5 \\ - 3,4 \\ \hline \end{array}$$

p.

$$\begin{array}{r} \\ + 2,6 \\ \hline 3,4 \end{array}$$

q.

$$\begin{array}{r} \\ - 3,6 \\ \hline 0,3 \end{array}$$

r.

$$\begin{array}{r} 4,0 \\ 0,3 \\ + 0,3 \\ \hline \end{array}$$

s.

$$\begin{array}{r} 1,3 \\ 2,3 \\ + 0,1 \\ \hline \end{array}$$

t.

$$\begin{array}{r} 2,4 \\ 0,4 \\ + 1,3 \\ \hline \end{array}$$

u.

$$\begin{array}{r} 1,3 \\ 1,4 \\ + 1,1 \\ \hline \end{array}$$

v.

$$\begin{array}{r} 2,3 \\ 0,5 \\ + 0,6 \\ \hline \end{array}$$

w.

$$\begin{array}{r} 1,6 \\ 1,4 \\ + 0,5 \\ \hline \end{array}$$

A nickel (n.) is worth five pennies (p.).

What Are My Rules?

WAMR...Set M

FRONT	BACK
n. p. 0,1	n. p. 0,4

FRONT	BACK
n. p. 0,2	n. p. 1,0

a.	
n. p. 0,4	n. p. 1,2

b.	
n. p. 0,0	n. p. ,

c.	
n. p. 1,0	n. p. ,

d.	
n. p. 0,3	n. p. ,

e.	
n. p. 1,2	n. p. ,

f.	
n. p. 2,2	n. p. ,

g.	
n. p. ,	n. p. 2,4

h.	
n. p. ,	n. p. 2,1

WAMR...Set N

FRONT	BACK
n. p. 0,2	n. p. 0,4

FRONT	BACK
n. p. 0,3	n. p. 1,1

i.	
n. p. 0,4	n. p. 1,3

j.	
n. p. 1,0	n. p. 2,0

k.	
n. p. 0,1	n. p. ,

l.	
n. p. 2,2	n. p. ,

m.	
n. p. 1,3	n. p. ,

n.	
n. p. ,	n. p. 2,2

o.	
n. p. 1,4	n. p. ,

p.	
n. p. ,	n. p. 5,1

There are sixty minutes (min.) in an hour (hr.).

Watch the signs!

Only numbers less than 60 in the white boxes.

A.	hr.	min.
	0	30
+	0	30
	1	00

B.	hr.	min.
	1	45
+	0	15
		00

C.	hr.	min.
	1	00
-	0	15

D.	hr.	min.
	7	00
-	2	00

E.	hr.	min.
	0	50
+	0	15
		05

F.	hr.	min.
	2	45
+	1	15

G.	hr.	min.
	3	30
-	0	29

H.	hr.	min.
	1	47
+	8	13

I.	hr.	min.
	17	27
-	7	27

J.	hr.	min.
	12	00
-	0	45

K.	hr.	min.
	11	45
+	12	15

L.	hr.	min.
	24	00
-	20	59

M.	hr.	min.
	15	50
-	6	40

N.	hr.	min.
	6	39
+	17	21

O.	hr.	min.
	10	05
-	0	06

There are seven days (da.) in a week (wk.).

Use only numbers less than 7 in the white boxes.

a. wk. da.

1	2
+	2
2	4
3	6

b. wk. da.

1	3
+	0
0	4
2	0

c. wk. da.

0	2
+	0
0	5

d.

0	4
+	0
0	4

e.

0	6
+	0
0	5

f. wk. da.

1	6
+	2
2	0

g.

1	3
+	1
1	5

h.

2	3
+	
3	0

i.

+	1
1	3
3	5

j.

2	4
+	
4	1

There are twelve inches (in.) in a foot (ft.).

Use only numbers less than 12 in the white boxes.

k. ft. in.

0	4
+	0
0	7
0	11

l. ft. in.

0	6
+	0
0	6
1	

m. ft. in.

0	10
+	0
0	5

n.

1	8
+	1
1	4

o.

1	4
+	
3	2

p. ft. in. + ft. in. || ft. in.

1	0	2	7	3	7
---	---	---	---	---	---

r.

1	8			3	11
---	---	--	--	---	----

q.

1	2	0	11		
---	---	---	----	--	--

s.

		0	9	2	0
--	--	---	---	---	---

A dime (d.) is worth ten pennies (p.).

Use only numbers less than 10 in the white boxes.

t. d. p.

2	3
+	0
0	5
2	

u. d. p.

0	5
+	0
0	5

v. d. p.

1	6
+	0
0	7

w.

2	4
+	6
6	5

x.

1	2
+	
2	0

y. d. p. + d. p. || d. p.

2	9	2	2		
---	---	---	---	--	--

z.

1	7			3	1
---	---	--	--	---	---

A quarter is worth five nickels and a nickel is worth five pennies.

Only numbers less than 5 in the white boxes.

a. $\begin{array}{r} 25\text{¢} \quad 5\text{¢} \quad 1\text{¢} \\ 1 \quad 0 \quad 0 \\ + 0 \quad 2 \quad 1 \\ \hline \end{array}$

b. $\begin{array}{r} 25\text{¢} \quad 5\text{¢} \quad 1\text{¢} \\ 1 \quad 2 \quad 3 \\ + 0 \quad 2 \quad 1 \\ \hline \end{array}$

c. $\begin{array}{r} 25\text{¢} \quad 5\text{¢} \quad 1\text{¢} \\ 1 \quad 1 \quad 1 \\ + \quad \quad \quad \\ \hline \quad 2 \quad 4 \end{array}$

d. $\begin{array}{r} 25\text{¢} \quad 5\text{¢} \quad 1\text{¢} \\ 1 \quad 2 \quad 4 \\ + 1 \quad 3 \quad 2 \\ \hline \end{array}$

e. $\begin{array}{r} 25\text{¢} \quad 5\text{¢} \quad 1\text{¢} \\ 1 \quad 1 \quad 1 \\ 0 \quad 2 \quad 4 \\ + 0 \quad 3 \quad 3 \\ \hline \end{array}$

f. $\begin{array}{r} 25\text{¢} \quad 5\text{¢} \quad 1\text{¢} \\ \quad 0 \quad 2 \\ 1 \quad \quad 0 \\ + 1 \quad 1 \quad \quad \\ \hline 3 \quad 3 \quad 4 \end{array}$

g. $\begin{array}{r} 25\text{¢} \quad 5\text{¢} \quad 1\text{¢} \\ 0 \quad 2 \quad 2 \\ 0 \quad 2 \quad \quad \\ + 0 \quad \quad 2 \\ \hline \quad 4 \quad 1 \end{array}$

h. $\begin{array}{r} 25\text{¢} \quad 5\text{¢} \quad 1\text{¢} \\ 0 \quad 0 \quad 4 \\ 0 \quad 1 \quad \quad \\ + 0 \quad \quad 4 \\ \hline \quad 0 \quad 2 \end{array}$

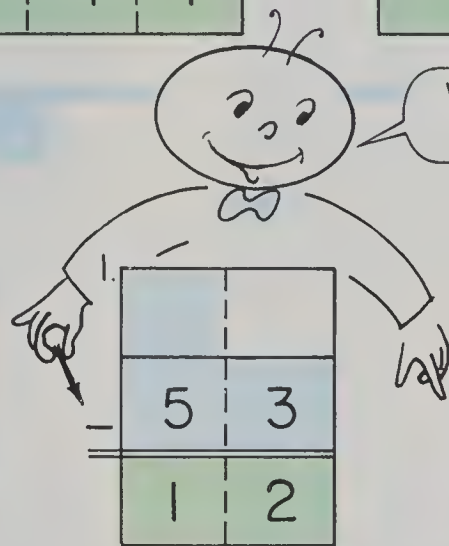
There are seven days in a week.

Only numbers less than 7 in the white boxes.

i. w. d. $\begin{array}{r} 2 \quad 1 \\ + 1 \quad 3 \\ \hline \end{array}$

j. $\begin{array}{r} 4 \quad 4 \\ + 2 \quad 3 \\ \hline \end{array}$

k. $\begin{array}{r} 4 \quad 5 \\ - 2 \quad 3 \\ \hline \end{array}$



m. $\begin{array}{r} 1 \quad 1 \\ - \quad \quad \\ \hline \quad 4 \end{array}$

n. $\begin{array}{r} 5 \quad 5 \\ + \quad \quad \\ \hline 11 \quad 4 \end{array}$

o. $\begin{array}{r} 5 \quad 0 \\ - 4 \quad 6 \\ \hline \end{array}$

p. $\begin{array}{r} 6 \quad \quad \\ + \quad \quad 3 \\ \hline 14 \quad 2 \end{array}$

q. $\begin{array}{r} \quad 0 \\ - 4 \quad \quad \\ \hline 5 \quad 1 \end{array}$

r. $\begin{array}{r} 10 \quad \quad \\ - 0 \quad \quad \\ \hline 9 \quad 1 \end{array}$

A dime is worth ten pennies.

Only numbers less than 10 in the white boxes.

s. d. p. $\begin{array}{r} 1 \quad 5 \\ 1 \quad 4 \\ + 1 \quad 6 \\ \hline \end{array}$

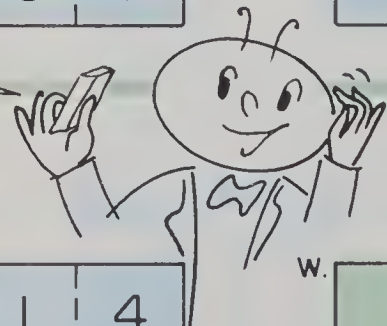
t. $\begin{array}{r} 0 \quad \quad \\ 1 \quad 7 \\ + 1 \quad 4 \\ \hline 4 \quad \quad \end{array}$

u. $\begin{array}{r} 2 \quad 7 \\ \quad 6 \\ + 2 \quad \quad \\ \hline 10 \quad 0 \end{array}$

v. $\begin{array}{r} 1 \quad 4 \\ 2 \quad \quad \\ + 2 \quad 2 \\ \hline \quad 0 \end{array}$

w. $\begin{array}{r} 1 \quad \quad \\ 1 \quad \quad \\ + 1 \quad \quad \\ \hline 5 \quad 5 \end{array}$

What did I erase?



What Are My Rules? Look for patterns when you complete the tables.

I

Number of		
nickels	pennies	cents
8	0	40
7	1	36
6	2	32
		16
		8
		4
less than 5		

II

Number of		
feet	inches	inches
		5
0	10	
1	3	
		20
		25
3	4	
3		45
		50
< 12		

III

Number of		
dimes	pennies	cents
4	5	45
	9	39
		36
		33
		30
2		24
2	1	
< 10		

IV

Number of		
weeks	days	days
0	6	
		8
		10
1	5	
2		16
		22
< 7		

V

Number of		
pounds	ounces	ounces
0	2	2
		7
		12
1	1	17
< 16		

VI

Number of		
gallons	quarts	quarts
		27
4	2	18
3	3	
3	0	12
		9
0	0	
< 4		

What Are My Rules?

A

Number of		
nickels	pennies	cents
0	2	2
0	4	4
1	1	6
		8
2	0	10
		12
		18
		less than 5

B

Number of		
weeks	days	days
0	1	1
0	3	3
		5
1	0	7
1	2	9
		15
2	3	
		<7

C

Number of		
feet	inches	inches
0	2	2
0	5	5
0	8	8
		11
1	2	14
		20
		26
		<12

D

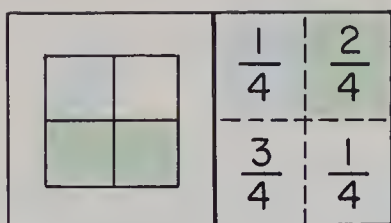
Number of		
dimes	pennies	cents
0	4	4
0	8	8
1	2	12
		20
		44
		<10

E

Number of		
dozen	eggs	eggs
0	5	5
0	10	10
1	3	15
		20
		50
		<12

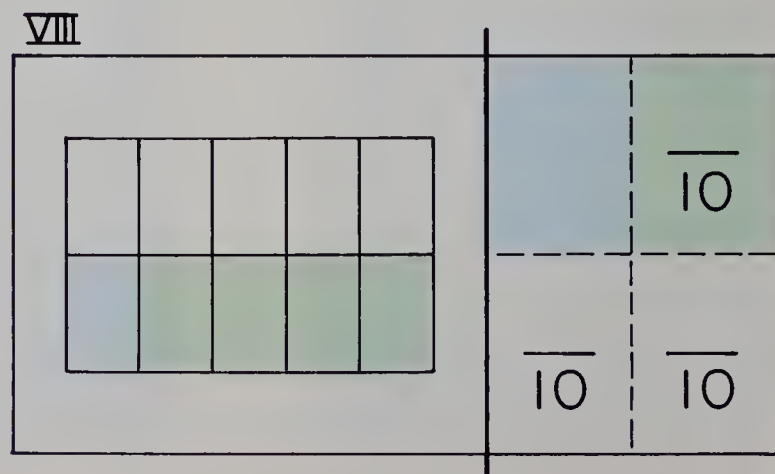
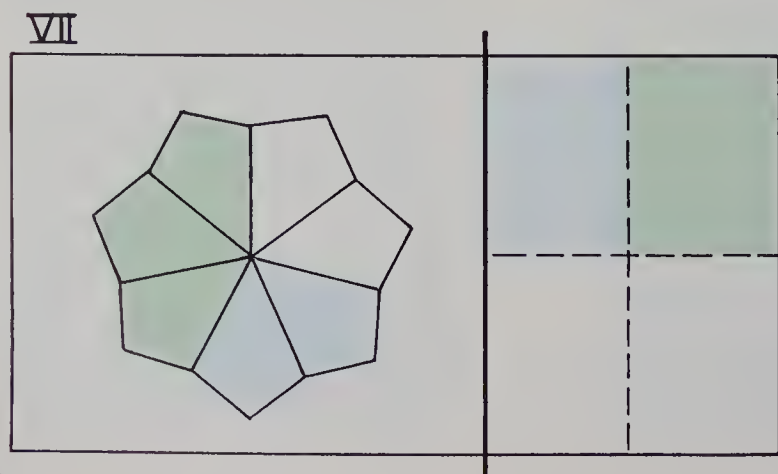
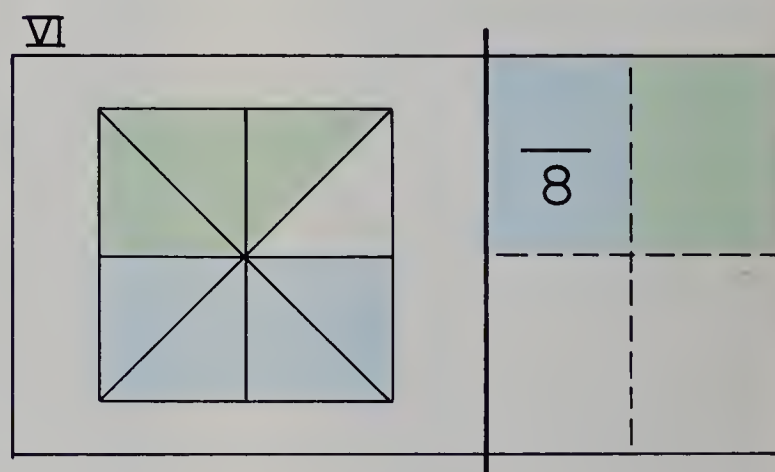
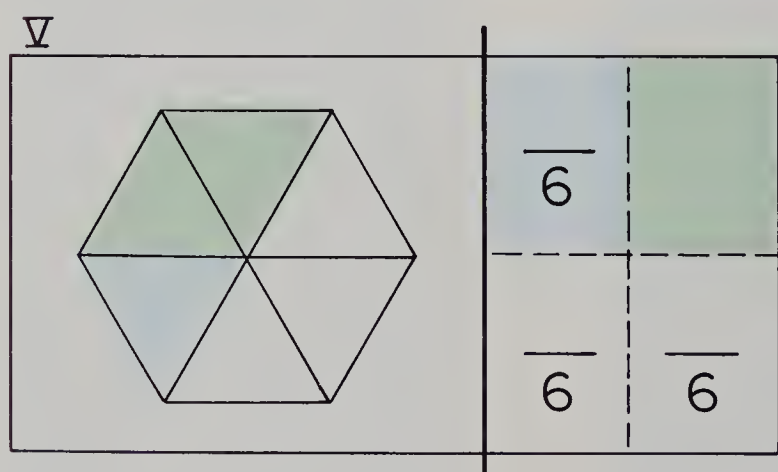
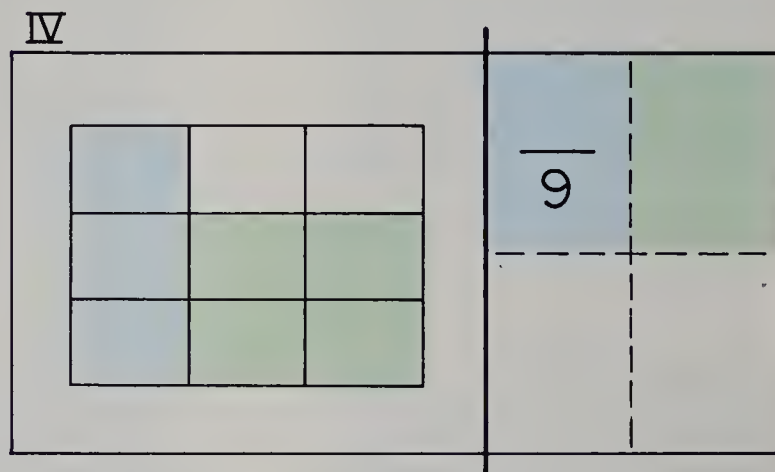
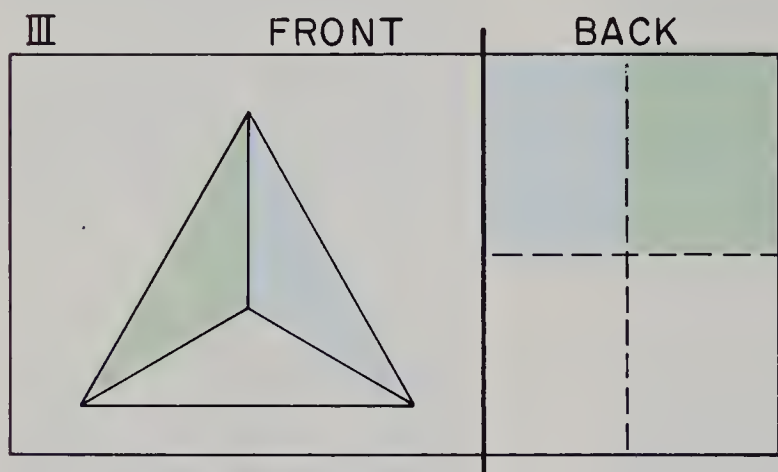
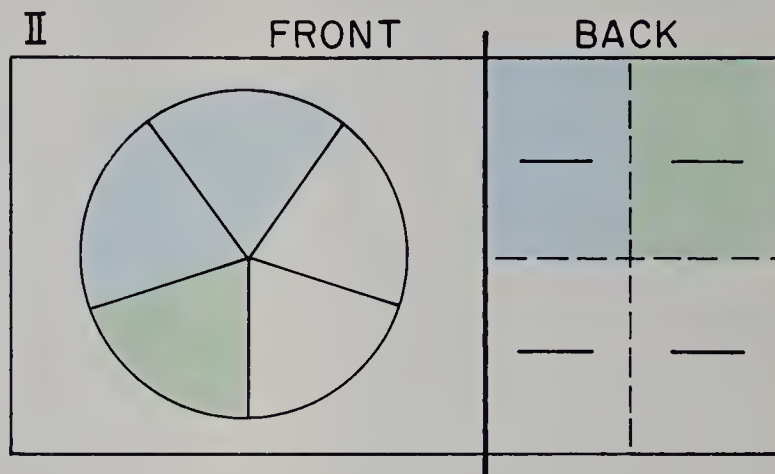
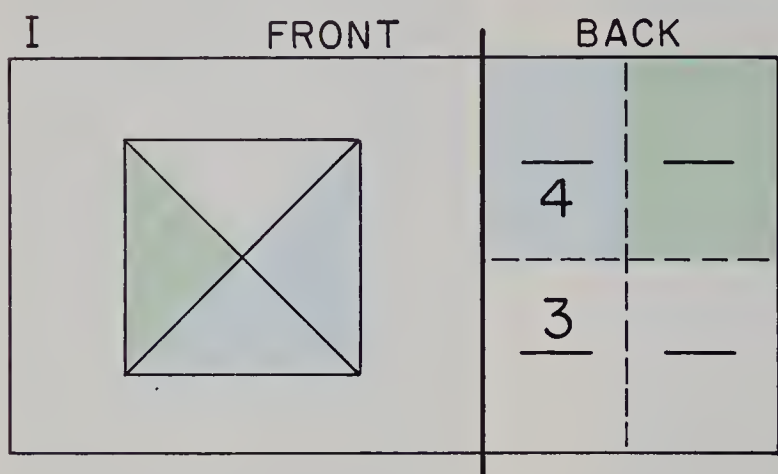
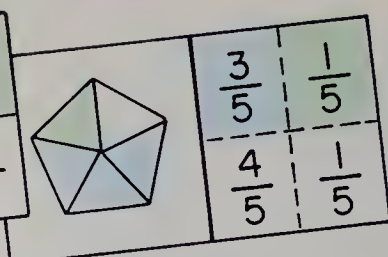
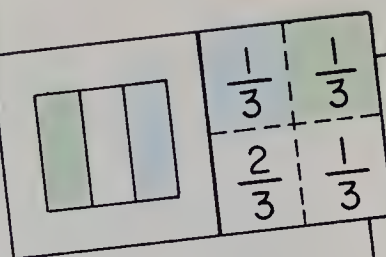
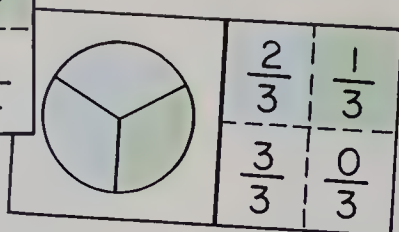
F

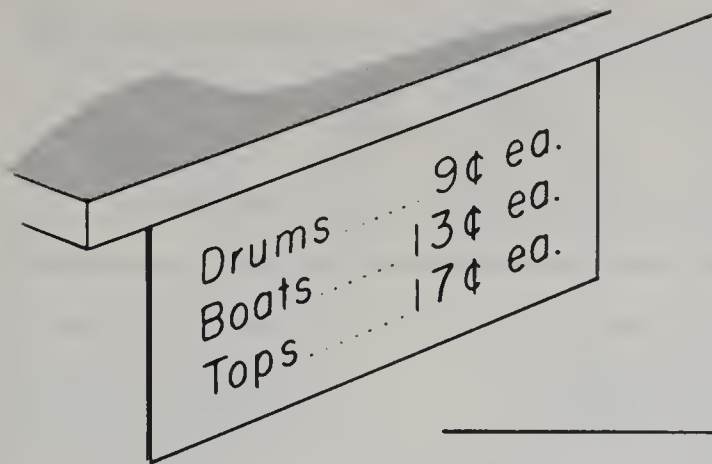
Number of		
hours	minutes	minutes
0	10	10
		20
		30
		60
		70
		<60



What Are My Rules?

WAMR... Set 0





Harry bought some toys at the toy store where there were drums and boats and tops. He bought fewer than four toys and gave the clerk a dollar.

What can we say?

Suppose that Harry bought only one toy. He could do that in three ways:

- (a) 1 drum _____ ¢; and _____ ¢ change
 (b) 1 boat _____ ¢; and _____ ¢ change
 (c) 1 top _____ ¢; and _____ ¢ change

Suppose that he bought two toys.

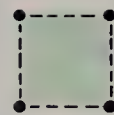
	Number of			Cost of			Total	Change
	drums	boats	tops	drums	boats	tops	cost	from \$1.00
(d)	2	0	0	18¢	0¢	0¢	18¢	82¢
(e)	1		0					
(f)	1		1					
(g)	0		0					
(h)	0		1	0¢	13¢	17¢	30¢	
(i)			2					

Suppose that he bought three toys.

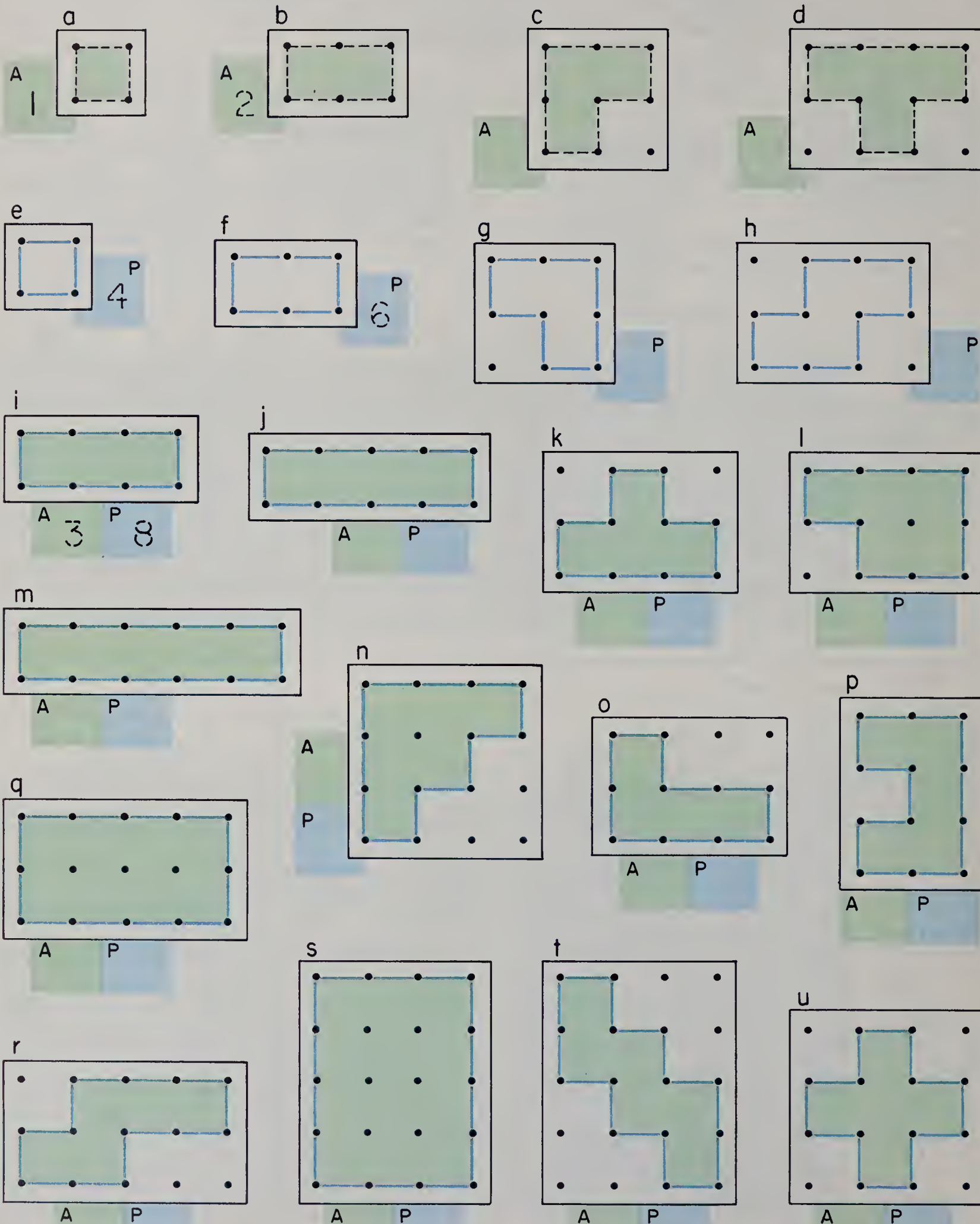
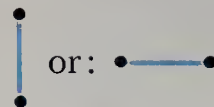
	Number of			Cost of			Total	Change
	drums	boats	tops	drums	boats	tops	cost	from \$1.00
(j)	3		0					
(k)	2	1						
(l)	2			18¢	0¢	17¢	35¢	
(m)	1		0					
(n)	1	1						
(o)	1							
(p)			0					
(q)			1					
(r)			2					
(s)								

Now, what can you say?

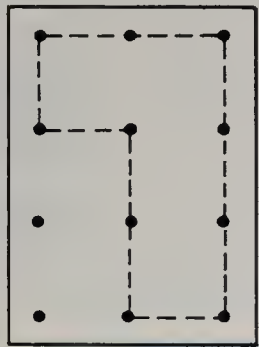
A . . . on these two pages is AREA. Here is one unit of area:

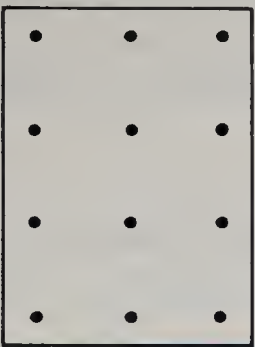


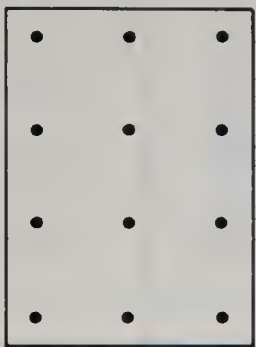
P . . . on these pages is PERIMETER. Here is one unit of perimeter:

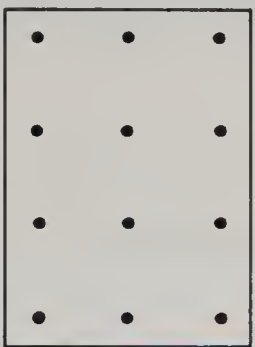


Please draw sketches with AREAS and PERIMETERS as indicated.

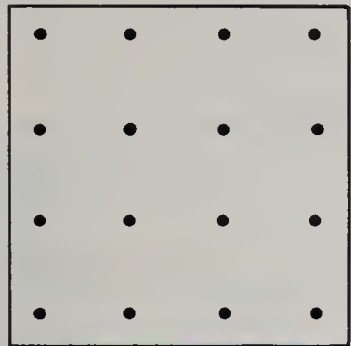
I  A 4 P 10

II  A 5 P 10

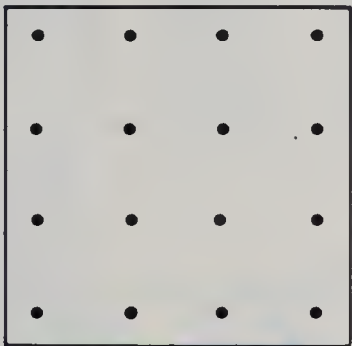
III  A 6 P 10

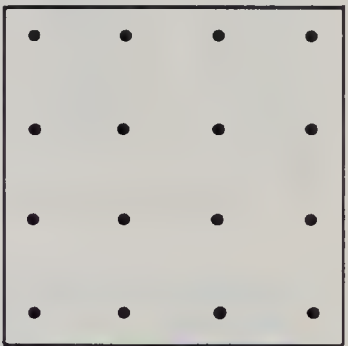
IV  A 5 P 12
(a puzzle)

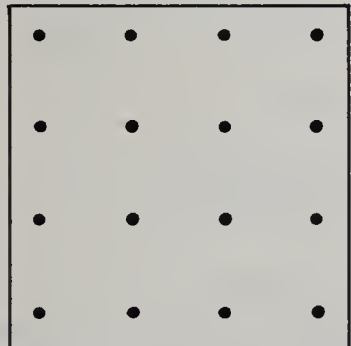
V  A 9 P 12

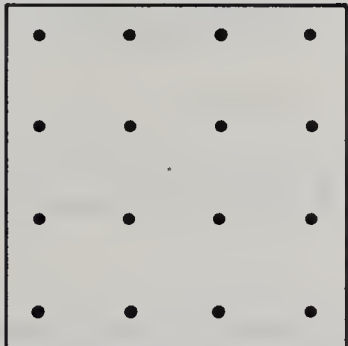
VI  A 8 P 12

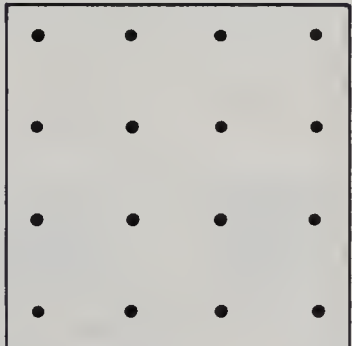
VII  A 6 P 12

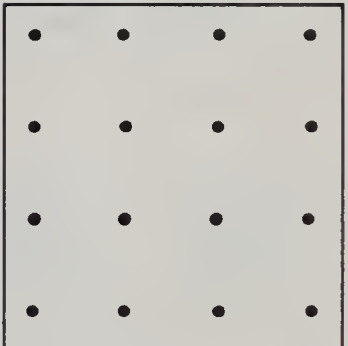
VIII  A 5 P 12

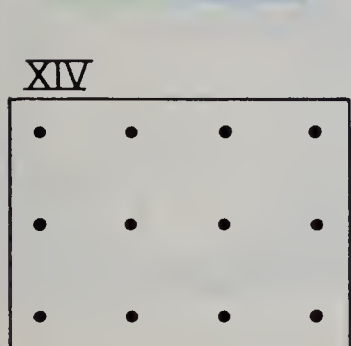
IX  A 8 P 14
(a puzzle)

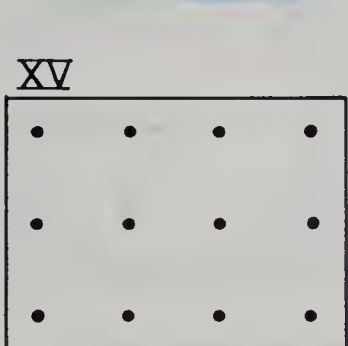
X  A 11 P 14

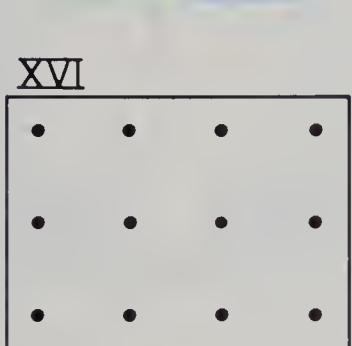
XI  A 12 P 14

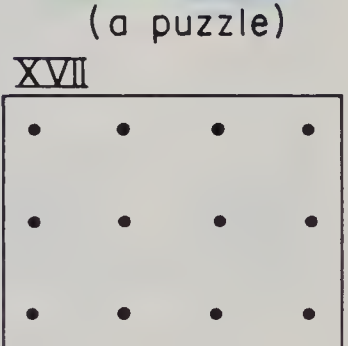
XII  A 9 P 14

XIII  A 10 P 16
(a puzzle)

XIV  A 7 P 16

XV  A 15 P 16

XVI  A 10 P 16

XVII  A 11 P 24
(a puzzle)

Show the largest amount with an A in the blue block; the next largest with a B; the next

largest with a C, etc. Write the differences in each example.

I
 Nine weeks
 Sixty days
 The months of April and May
 together

Difference between

A and B: _____

B and C: _____

A and C: _____

II
 One yard, two feet, and eleven inches ...
 Six feet
 Two yards and one inch

Difference between

A and B: _____

B and C: _____

A and C: _____

III
 Forty-nine ounces
 Two pounds and eighteen ounces ...
 Three pounds
 One pound and thirty-five ounces

Difference between

A and B: _____

B and D: _____

B and C: _____

C and D: _____

A and C: _____

A and D: _____

IV
 Fifty-five pints
 Seven gallons
 Six gallons and nine pints
 Four gallons, five quarts, and twelve
 pints

Difference between

A and B: _____

B and D: _____

B and C: _____

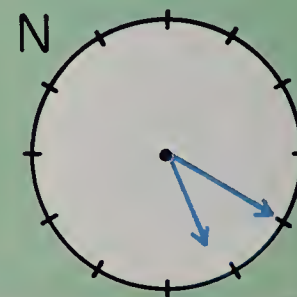
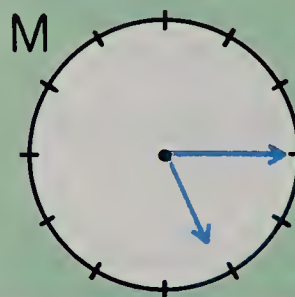
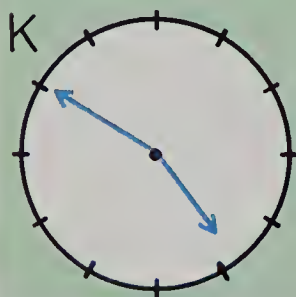
C and D: _____

A and C: _____

A and D: _____

V Sally was waiting for her favorite TV program to begin at 5:45. She looked at the clock

four different times before the program started:



How long was it before the program started in each case?

How long was it between the times she looked at the clock?

K: _____ min. to wait

K and L: _____ min.

K and M: _____ min.

L: _____ min. to wait

K and N: _____ min.

L and M: _____ min.

M: _____ min. to wait

L and N: _____ min.

N: _____ min. to wait

M and N: _____ min.

Numo the Magician

At a school show, Numo and his sister, Numa, put on a great act. At first, people thought it was magic.

First, someone took Numo out in the hall so that he couldn't see what was going on.

Then Numa asked someone to write a number on the board — one of the whole numbers — 1 thru 32. She would then cover the number with a heavy piece of cardboard and have someone call Numo back into the room.

After a look at Numa, Numo would stare at the cardboard.

"I'll put my x-ray eyes to work," Numo would say. "Through the card I can see the number 17 on the board."

Everyone said, "Wow! He was right!" Numa lifted the card for everyone to see — 17. Mothers and fathers were as surprised as the children.

After Numo did the trick many times without missing, everyone called out, "Tell us how you do it!"

Numo looked at Numa. Should he tell them? After thinking about it for a second, she said, "Let's do it."

Numo Gives the Secret Away

"Well," Numo began, "I'll tell you the secret, if you promise not to tell anyone else."

Everyone called out, "We promise."

"Well, it's very simple. Numa tells me with the fingers on her right hand what the secret number is."

Numo and Numa sat down.

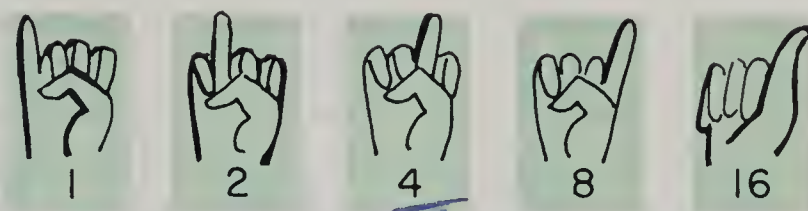
Everyone was quiet for a minute.

Then someone called out, "How can she do that?"

Numo stood up. "You see, most people can only count to 5 with the fingers of one hand. Numa and I can count to 32 with the same 5 fingers."

"How can you do it?"

"We do it this way. We let the little finger stand for 1, the ring finger for 2, the middle finger for 4, the forefinger for 8, and the thumb for 16." He drew a picture on the board.



"For other numbers, we use two or more fingers."



"Now you try it. What do these fingers stand for?"

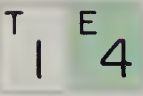
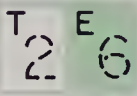
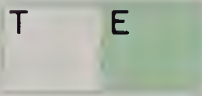
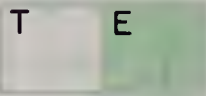
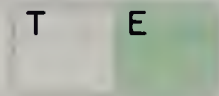
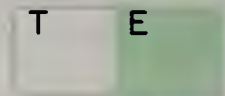


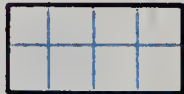
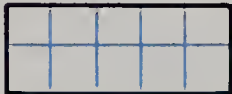
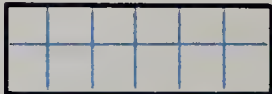
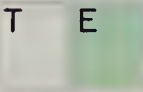
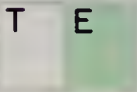
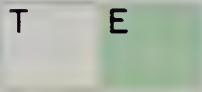
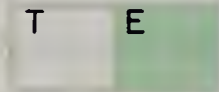
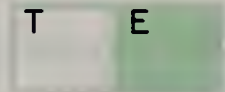
Then Numo asked three questions:

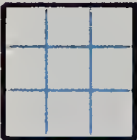
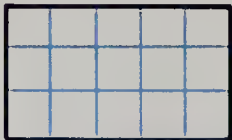
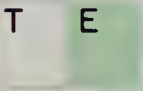
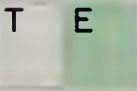
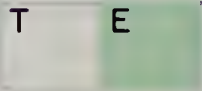
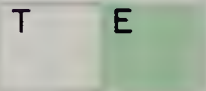
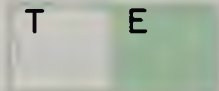
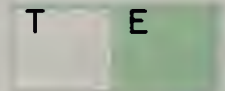
1. "Can you find a whole number between 1 and 32 we can't make on the fingers of one hand?"
2. "Can we make any number in more than one way?"
3. "What do no fingers up stand for?"

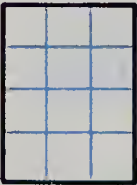
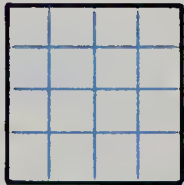
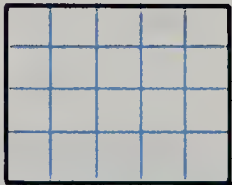
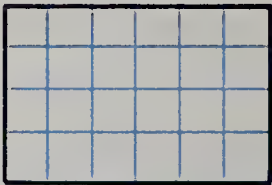
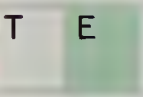
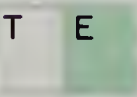
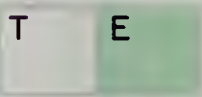
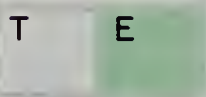
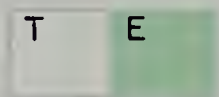
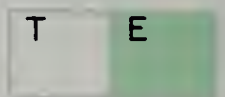
T . . . on these two pages is the number of TILES this size: 

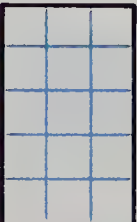
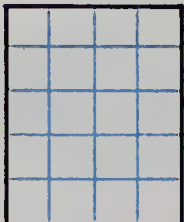
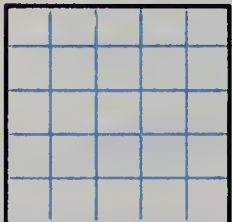
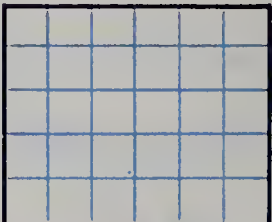
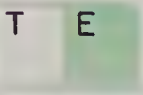
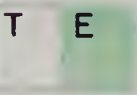
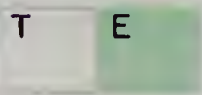
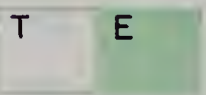
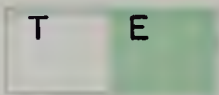
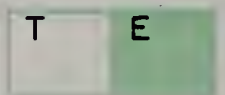
E . . . on these pages is the distance around EDGE in units this size:  or: 

	I	II	III	IV	V	VI
						
a						

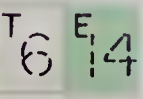
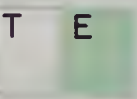
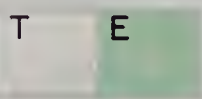
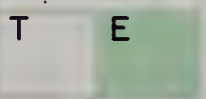
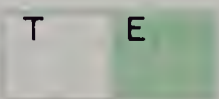
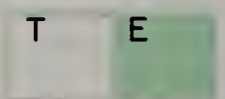
						
b						

						
c						

						
d						

						
e						

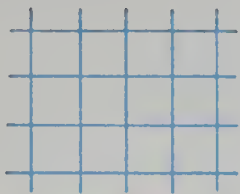
Can you imagine the next row of sketches?

						
f						

Problem: Show an arrangement of the number of tiles given with the *shortest* distance around the edge.



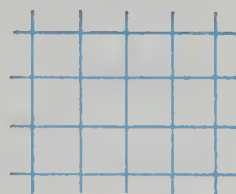
a. $\begin{matrix} T & E \\ 4 & 8 \end{matrix}$



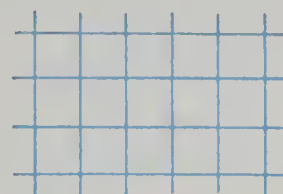
b. $\begin{matrix} T & E \\ 5 & \end{matrix}$



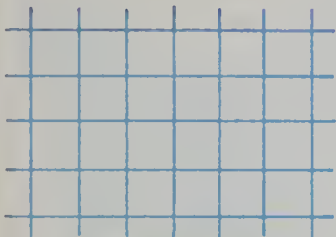
c. $\begin{matrix} T & E \\ 6 & \end{matrix}$



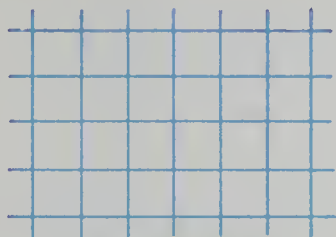
d. $\begin{matrix} T & E \\ 7 & \end{matrix}$



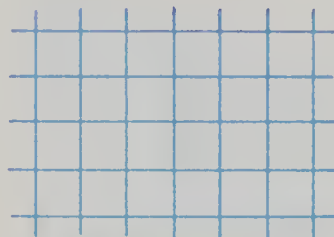
e. $\begin{matrix} T & E \\ 8 & \end{matrix}$



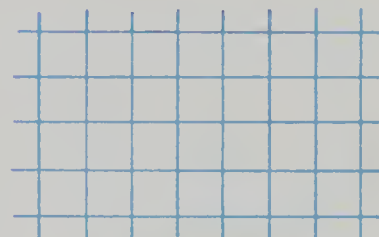
f. $\begin{matrix} T & E \\ 9 & \end{matrix}$



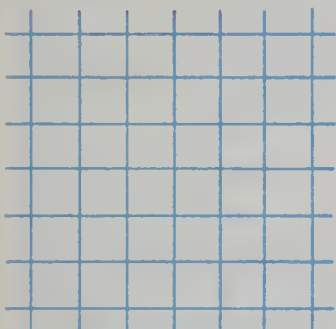
g. $\begin{matrix} T & E \\ 10 & \end{matrix}$



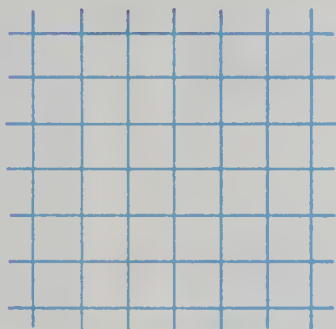
h. $\begin{matrix} T & E \\ 11 & \end{matrix}$



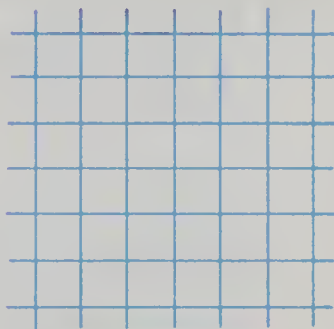
i. $\begin{matrix} T & E \\ 12 & \end{matrix}$



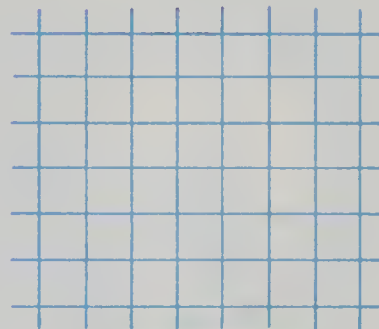
j. $\begin{matrix} T & E \\ 13 & \end{matrix}$



k. $\begin{matrix} T & E \\ 14 & \end{matrix}$



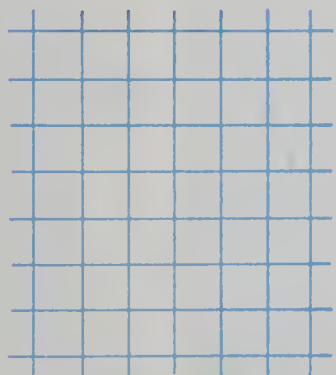
l. $\begin{matrix} T & E \\ 15 & \end{matrix}$



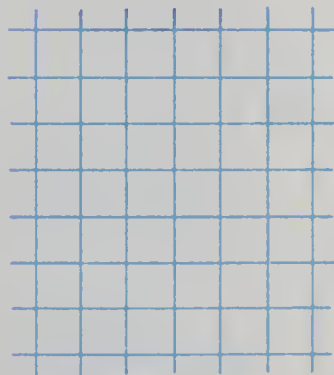
m. $\begin{matrix} T & E \\ 16 & \end{matrix}$



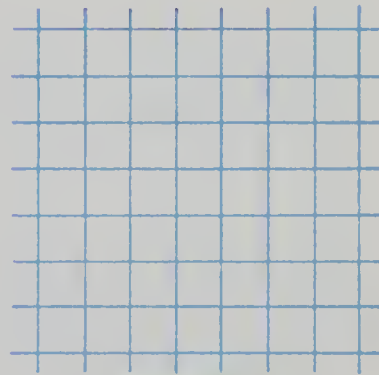
n. $\begin{matrix} T & E \\ 17 & \end{matrix}$



o. $\begin{matrix} T & E \\ 18 & \end{matrix}$



p. $\begin{matrix} T & E \\ 19 & \end{matrix}$



q. $\begin{matrix} T & E \\ 20 & \end{matrix}$

What's My Rule?

0 , 1 , 3 , 6 , 10 , , , , , , 55

$$18 + \square = 35 - 10$$

(1) (2) (3) (4)

☐ 7 ☐ 9 ☐ 15 ☐ 4

Mark correct
answer.

Mark the furthest
from the correct answer.

(1) (2) (3) (4)

☒ ☐ ☒ ☐

← Difference between the
answers you marked.

8

1 $\square + 19 = 14 + 17$

(1) (2) (3) (4)
☐ 10 ☐ 15 ☐ 12 ☐ 20

1 2 3 4
☐ ☐ ☐ ☐ ----

2 $7 + 18 = \triangle + 7$

(1) (2) (3) (4)
☐ 25 ☐ 35 ☐ 78 ☐ 18

1 2 3 4
☐ ☐ ☐ ☐ ----

3 $21 + \square = 49 + 21$

(1) (2) (3) (4)
☐ 12 ☐ 49 ☐ 94 ☐ 70

1 2 3 4
☐ ☐ ☐ ☐ ----

4 $\triangle + 40 = 70 - 13$

(1) (2) (3) (4)
☐ 17 ☐ 13 ☐ 30 ☐ 110

1 2 3 4
☐ ☐ ☐ ☐ ----

5 $39 + \square = 63 + 39$

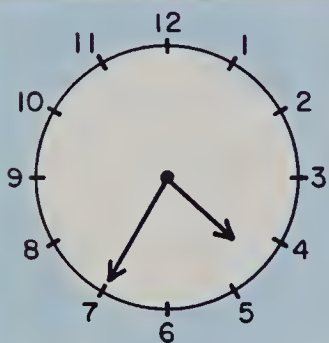
(1) (2) (3) (4)
☐ 57 ☐ 36 ☐ 93 ☐ 63

1 2 3 4
☐ ☐ ☐ ☐ ----

6 $128 + 45 = 45 + \triangle$

(1) (2) (3) (4)
☐ 45 ☐ 128 ☐ 145 ☐ 90

1 2 3 4
☐ ☐ ☐ ☐ ----



7 The time shown on the
clock is:

(1) 7:20 (3) 7:35

(2) 4:35 (4) 5:35

1 2 3 4
☐ ☐ ☐ ☐ ----hrs., ----min.

8 The time in 1 hour and a
half will be:

(1) 5:05 (3) 7:00

(2) 5:35 (4) 6:05

1 2 3 4
☐ ☐ ☐ ☐ ----hrs., ----min.

9

How long is it until the
clock will next read 12:00?

(1) 7 hrs., 25 minutes

(2) 8 hrs., 35 minutes

(3) 12 hrs., 0 minutes

(4) 4 hrs., 35 minutes

1 2 3 4
☐ ☐ ☐ ☐ ----hrs., ----min.

10

What time will the clock
show 12 hours later?

(1) 3:45

(2) 4:35

(3) 5:34

(4) 4:47

1 2 3 4
☐ ☐ ☐ ☐ ----hrs., ----min.

11

What time will the clock
show in 43 minutes?

(1) 5:43

(2) 5:18

(3) 4:43

(4) 6:34

1 2 3 4
☐ ☐ ☐ ☐ ----hrs., ----min.

12

About what time will it be
when the hands are together
next?

(1) 5:35

(2) 12:00

(3) 6:00

(4) 5:27

1 2 3 4
☐ ☐ ☐ ☐ ----hrs., ----min.

A.

		x 2	x 3	x 5
+ 9	+	x 4	x 6	x 10
	20			

B.

		x 2	x 3	x 5
+	+	x 6	x 9	x 15
18	27			

C.

		x 3	x 2	x 5
+ 17	+ 45	x 6	x 4	x 10

D.

		x 2	x 3	x 5
x 20	x 30	x 4	x 6	x 10

E.

twice as much

2 nickels, 4 pennies

three times as much
(use fewest coins)

 n., p.

four times as much
(use fewest coins)

 n., p.

9¢ more
(use fewest coins)

 n., p.

13¢ more
(use fewest coins)

 n., p.

F.

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

twice as many days
as those shaded green

2 weeks, 6 days

three times as many days
as those shaded green

 wk., da.

four times as many days
as those shaded green

 wk., da.

9 days more than those
shaded green

 wk., da.

13 days more than those
shaded green

 wk., da.

G.

a one foot ruler

length of block

 feet, inches

twice as long

 ft., in.

three times as long

 ft., in.

half as long

 ft., in.

four times as long

 ft., in.



Adding machine! It adds all right, but it doesn't print the third item. How am I going to find the item?

A.
\$.25
.36
.24
1.00
T \$ 2.23

B.
\$ 125.00
15.93
18.09
T \$ 366.77

C.
\$ 302.85
48.67
100.00
17.28
T \$ 557.35

D.
\$ 1.08
.56
.83
2.12
.75
1.56
.50
1.10
.12
.07
T \$ 10.16

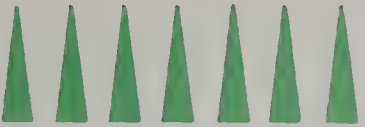
E.
\$ 355.75
25.00
34.83
19.66
T \$ 635.24

F.
\$.30
1.00
10.50
2.25
3.75
.90
3.07
6.10
1.04
30.00
5.68
T \$ 76.93

H.
\$ 10.25
5.62
37.48
.56
1.27
T \$ 65.18

G.
\$ 2,350.00
750.85
487.99
T \$ 5,114.09

What Are My Rules?



a row of 7 blocks

A.

twice as many	14	three times as many	
5 rows of blocks		ten times as many	



a row of 14 blocks

B.

	twice as many	
half as many		
ten times as many		
	three times as many	
	five times as many	

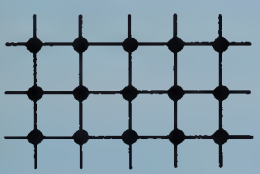
A A A A A B B B B B B B B B

a row with 5 A's and 9 B's

The total number of letters is

C.

	three times as many A's	
	three times as many B's	
	three times as many letters	
five times as many letters		ten times as many letters



- 8

+ 9

D.

x 2	x 3	x 5
x 4	x 6	x 10

11.

(shorthand for twenty-one)

+ 39

100

E.

x 2	x 3	x 5
x 4	x 6	x 10



F.

3 times as much		6 times as much	
2 times as much		4 times as much	
5 times as much		10 times as much	
7 times as much		14 times as much	
half as much		one dollar more	

What Are My Rules?

A

6	5	11
x 4	x 4	x 4

B

7		
x 6	x 6	x 6

C

4		
x 6	x 6	x 6

D

9		
x 7	x 7	x 7

E

4		
x 9	x 9	x 9

F

5		
x 10	x 10	x 10

G

 Cones 8¢	 Candy Bars 5¢	cost of 5 cones	¢	15 cones	\$
		cost of 5 bars	¢	15 bars	\$
		cost of 5 of each	¢	15 of each	\$

H

	8 half-dollars		12 half-dollars	
	8 quarters		12 quarters	
	8 dimes		12 dimes	
	8 nickels		12 nickels	
	8 of each		12 of each	

I. $12 \times 4 =$

$\begin{array}{r} 10 \\ \times 4 \\ \hline 40 \end{array}$	$\begin{array}{r} 2 \\ \times 4 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ \times 4 \\ \hline \end{array}$
--	--	---

II. $13 \times 5 =$

$\begin{array}{r} 10 \\ \times 5 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ \times 5 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ \times 5 \\ \hline \end{array}$
---	--	---

III. $15 \times 7 =$

$\begin{array}{r} 10 \\ \times \\ \hline \end{array}$	$\begin{array}{r} 5 \\ \times \\ \hline \end{array}$	$\begin{array}{r} 15 \\ \times \\ \hline \end{array}$
---	--	---

IV. $24 \times 6 =$

$\begin{array}{r} 10 \\ \times 6 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ \times 6 \\ \hline \end{array}$	$\begin{array}{r} 20 \\ \times 6 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ \times 6 \\ \hline \end{array}$	$\begin{array}{r} 24 \\ \times 6 \\ \hline \end{array}$
---	---	---	--	---

V. $28 \times 9 =$

$\begin{array}{r} 20 \\ \times 9 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ \times 9 \\ \hline \end{array}$	$\begin{array}{r} 28 \\ \times 9 \\ \hline \end{array}$
---	--	---

Let's begin imagining the lines and crossing points.

VI. $18 \times 3 =$

$\begin{array}{r} 10 \\ \times 3 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ \times 3 \\ \hline \end{array}$	$\begin{array}{r} 18 \\ \times 3 \\ \hline \end{array}$
---	--	---

VII. $25 \times 4 =$

$\begin{array}{r} 20 \\ \times 4 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ \times 4 \\ \hline \end{array}$	$\begin{array}{r} 25 \\ \times 4 \\ \hline \end{array}$
---	--	---

VIII. $35 \times 6 =$

$\begin{array}{r} 30 \\ \times 6 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ \times 6 \\ \hline \end{array}$	$\begin{array}{r} 35 \\ \times 6 \\ \hline \end{array}$
---	--	---

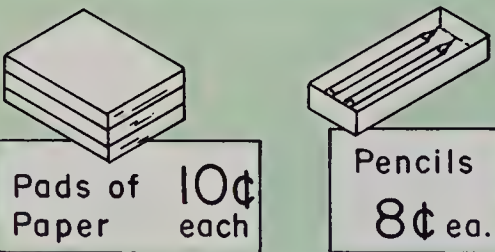
IX.

$3 \times \text{---}$	4	2	6	8	14	22	36	58	94	152	246	398
	12	6	18			66						

What Are My Rules?

A		How many letters?			
A row of G's: G G G G G G G G G G		1 row of G's	10	6 rows of G's	
A row of H's: H H H H		1 row of H's		6 rows of H's	
		1 row of each		6 rows of each	
4 rows of G's		10 rows of G's		14 rows of G's	
4 rows of H's		10 rows of H's		14 rows of H's	
4 rows of each		10 rows of each		14 rows of each	

B		What are the coins worth?			
		dimes shown	20¢	twice as many dimes	
		pennies shown	3¢	twice as many pennies	
		amount shown		twice amount shown	
5 × pennies shown		10 × pennies		15 × pennies	
5 × dimes shown		10 × dimes		15 × dimes	
5 × all coins	\$1.15	10 × all coins		15 × all coins	

C		What is the cost?			
 Pads of Paper 10¢ each Pencils 8¢ ea.		2 pencils		2 of each	36¢
		5 pencils		5 of each	
		7 pencils		7 of each	
6 pads		6 pencils		6 of each	
20 pads		20 pencils		20 of each	
26 pads		26 pencils		26 of each	

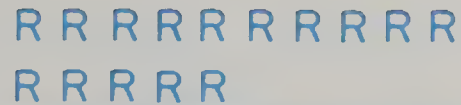
D											
7x	5	10	15	10x	5	10	15	17x	5	10	15
	35	70				100					

A



2 x 3 6	10 x 3 30	12 x 3 36
---------------	-----------------	-----------------

B



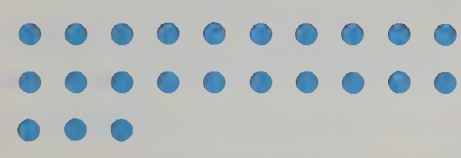
5 x 2	10 x 2	15 x 2
----------	-----------	-----------

C



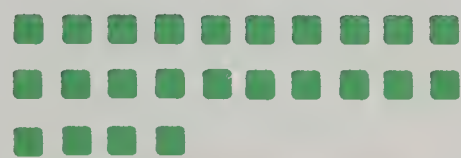
6 x 3	10 x 3	16 x 3
----------	-----------	-----------

D



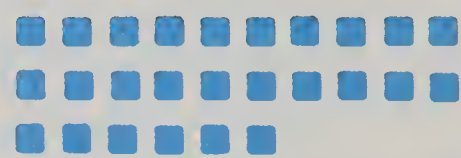
3 x 3	20 x 3	23 x 3
----------	-----------	-----------

E



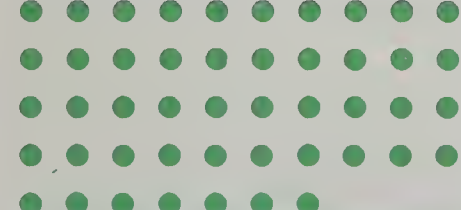
 x 3	20 x 3	24 x 3
---------	-----------	-----------

F



6 x 4	 x 4	 x 4
----------	---------	---------

G



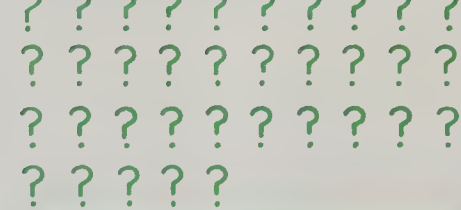
7 x 5	 x 5	 x 5
----------	---------	---------

H



 x 6	 x 6	 x 6
---------	---------	---------

I



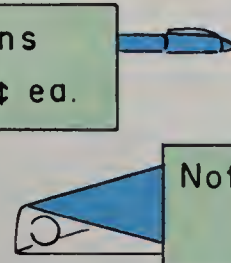
 x 7	 x 7	 x 7
---------	---------	---------

J



3 doz. eggs	eggs	5 doz. eggs	eggs
6 doz. eggs	eggs	10 doz. eggs	eggs

K



Pens 15¢ ea.	3 pens	¢	7 pens	\$
Notebooks 21¢ ea.	3 notebooks	¢	7 notebooks	\$
	3 of each	\$	7 of each	\$

a. $26 \times 4 =$

20 6
 { 80 } 4

$\begin{array}{r} 26 \\ \times 4 \\ \hline \end{array}$

b. $17 \times 6 =$

10 7
 { } 6

$\begin{array}{r} 17 \\ \times 6 \\ \hline \end{array}$

c. $37 \times 3 =$

30 7
 { } }

$\begin{array}{r} 37 \\ \times 3 \\ \hline \end{array}$

d. $19 \times 5 =$

{ } }

$\begin{array}{r} 19 \\ \times 5 \\ \hline \end{array}$

e. $70 \times 8 =$

70 0
 { } }

$\begin{array}{r} 70 \\ \times 8 \\ \hline \end{array}$

f. $32 \times 6 =$

{ } }

$\begin{array}{r} 32 \\ \times 6 \\ \hline \end{array}$

You don't need the colored blocks to show where the crossing points would be.

g. $23 \times 9 =$

20 3
 { (180) () } 9

$\begin{array}{r} 23 \\ \times 9 \\ \hline \end{array}$

h. $45 \times 7 =$

40 5
 { () () } }

$\begin{array}{r} 45 \\ \times 7 \\ \hline \end{array}$

i. $36 \times 8 =$

{ () () } }

$\begin{array}{r} 36 \\ \times 8 \\ \hline \end{array}$

We have left out some of the steps we used above. Work on scratch paper if you wish to write the steps we left out.

j. $15 \times 9 =$

{ () () } 9

$\begin{array}{r} 15 \\ \times 9 \\ \hline \end{array}$

k. $26 \times 7 =$

{ } }

$\begin{array}{r} 26 \\ \times 7 \\ \hline \end{array}$

In doing the following examples, you should imagine the sketches. Use a piece of scratch paper to draw a sketch whenever you are in doubt.

A

14 x =		
10 x	4 x 6	x

B

x =		
x	x	21 x 7

C

x 5 =		
10 x	8 x	x

D

12 x 3 =		
x	x	x

E

16 x 6 =		
x	x	x

F

13 x 7 =		
x	x	x

G

16 x 5 =		
x	x	x

H

25 x 6 =		
x	x	x

I

24 x 6 =		
x	x	x

J

x 4 = 48		
x 4	x 4	x 4 48

K

x 5 = 125		
x	x	x

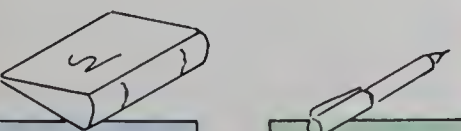
L

x 6 = 162		
x	x	x

M

	twice as many dimes	¢	9 times as many dimes	\$.
	twice as many pennies	¢	9 times as many pennies	\$.
	twice as much as 13¢	¢	9 times as much as 13¢	\$.

N

 Notebooks 30¢ ea. Pens 8¢ ea.	½ dozen notebooks	\$.	a dozen notebooks	\$.
	½ dozen pens	\$.	a dozen pens	\$.
	½ dozen of each	\$.	a dozen of each	\$.

A

$31 \times 5 =$

x

x

$$\begin{array}{r} 31 \\ \times 5 \\ \hline \end{array}$$

B

$\quad \times =$

x

x

$$\begin{array}{r} 15 \\ \times 3 \\ \hline \end{array}$$

C

$\quad \times =$

x

x

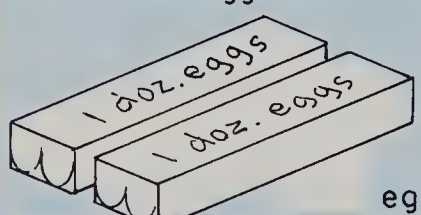
$$\begin{array}{r} 23 \\ \times 8 \\ \hline \end{array}$$

Try to complete the following in the shortest way you can. Use scratch paper if you wish.

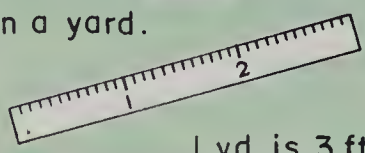
	I	II	III	IV	V	VI	VII	VIII	IX
D	$\begin{array}{r} 64 \\ \times 2 \\ \hline \end{array}$	$\begin{array}{r} \\ \times 4 \\ \hline 52 \end{array}$	$\begin{array}{r} \\ \times 4 \\ \hline 104 \end{array}$	$\begin{array}{r} 40 \\ \times 6 \\ \hline \end{array}$	$\begin{array}{r} 58 \\ \times 3 \\ \hline \end{array}$	$\begin{array}{r} 25 \\ \times \\ \hline 150 \end{array}$	$\begin{array}{r} 75 \\ \times \\ \hline 375 \end{array}$	$\begin{array}{r} \\ \times 9 \\ \hline 135 \end{array}$	$\begin{array}{r} 60 \\ \times 5 \\ \hline \end{array}$
E	$\begin{array}{r} 20 \\ \times 8 \\ \hline \end{array}$	$\begin{array}{r} \\ \times 5 \\ \hline 200 \end{array}$	$\begin{array}{r} \\ \times 9 \\ \hline 216 \end{array}$	$\begin{array}{r} 24 \\ \times 3 \\ \hline \end{array}$	$\begin{array}{r} 24 \\ \times 5 \\ \hline \end{array}$	$\begin{array}{r} 24 \\ \times 8 \\ \hline \end{array}$	$\begin{array}{r} \\ \times 7 \\ \hline 224 \end{array}$	$\begin{array}{r} \\ \times 2 \\ \hline 64 \end{array}$	$\begin{array}{r} 32 \\ \times 9 \\ \hline \end{array}$
F	$\begin{array}{r} 36 \\ \times 3 \\ \hline \end{array}$	$\begin{array}{r} 36 \\ \times 7 \\ \hline \end{array}$	$\begin{array}{r} 36 \\ \times 10 \\ \hline \end{array}$	$\begin{array}{r} 25 \\ \times 7 \\ \hline \end{array}$	$\begin{array}{r} 25 \\ \times 9 \\ \hline \end{array}$	$\begin{array}{r} 25 \\ \times 16 \\ \hline \end{array}$	$\begin{array}{r} 16 \\ \times 5 \\ \hline \end{array}$	$\begin{array}{r} 16 \\ \times 10 \\ \hline \end{array}$	$\begin{array}{r} 16 \\ \times 15 \\ \hline \end{array}$

If you found shortcuts as you completed the examples above, talk to others about your findings. Share your discoveries.

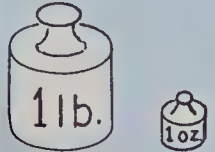
G

 eggs.	Two dozen eggs is	3 times as many	eggs	4 times as many	
		5 times as many		6 times as many	
		8 times as many		10 times as many	

H

 1 yd. is 3 ft.	There are inches	2 yards is	in.	3 yards is	in.
	in a yard.	4 yards is	in.	7 yards is	in.
		6 yards is	in.	10 yards is	in.

I

 1 lb. 1 oz.	There are ounces in	3 pounds is	oz.	5 pounds is	oz.
	one pound.	8 pounds is	oz.	10 pounds is	oz.
		11 pounds is	oz.	15 pounds is	oz.

A

			+25	-8
-13	+		-19	
	46	10		100

B

			+27	-15
--				
3	30	75	18	100

C

			+2	-20
		-29		
15	51		76	100

D

			-6	+8
50	11	18	0	100

E

			+10°	-5°
			°	°
			+33°	-13°
			°	°
+	°	°	°	°
84°	27°	75°	12°	100°

F

			+9¢	-9¢
			-25¢	+50¢
	-36¢			
27¢		11¢	\$1.00	80¢

G

twice as much	
_____ ¢	
half as much	
_____ ¢	

H

16¢	20¢
3 drums and 1 car	
_____ ¢	
2 of each	
_____ ¢	

I

twice as many eggs	
_____ doz., _____ eggs	
half as many eggs	
_____ doz., _____ eggs	

What Are My Rules?

A

wk.	da.	da.
7	1	50
- 2	- 0	- 14

<7

B

wk.	da.	da.
8	6	62
- 2	- 6	- 20

C

wk.	da.	da.
10	0	70
- 3	- 1	- 22

D

wk.	da.	da.
11	3	80
- 3	- 5	- 26

E

wk.	da.
10	5
- 3	- 4

F

wk.	da.
12	6
8	4

G

wk.	da.
15	
	0
10	0

H

wk.	da.
17	
- 5	- 5
	3

I

wk.	da.
- 6	- 3
12	6

I

10¢	1¢	cents
8	7	87
- 3	- 4	- 34

<10

II

10¢	1¢	cents
13	8	138
		97

III

10¢	1¢	cents
		76
		57

IV

10¢	1¢	cents
12		129
		98

V

10¢	1¢
10	0
- 8	- 3

VI

10¢	1¢
13	8
2	9

VII

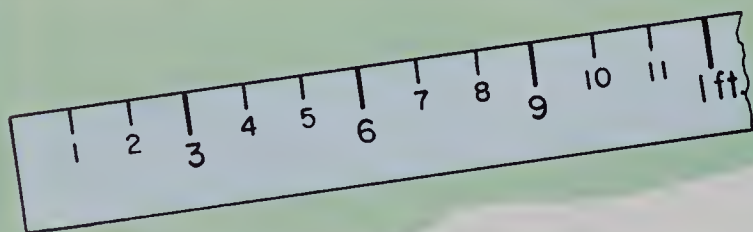
10¢	1¢
- 8	- 9
1	1

VIII

10¢	1¢
32	4
- 23	- 5

IX

10¢	1¢
15	3
- 6	
	1



a

ft.	in.	in.
3	0	36
+ 5	+ 4	+ 64

<12

b

ft.	in.	in.
5	3	63
3	10	46
		12

c

ft.	in.	in.
3	9	45
3	8	44
		28
		27

d

ft.	in.	in.
		19
		39
	11	59
		29
	11	23

All About Weeks and Days

wk.	da.
0	3
0	6
+	
1	2

wk.	da.
1	0
1	1
+	
2	1

wk.	da.	wk.	da.	wk.	da.
1	2	2	1	3	

wk.	da.	wk.	da.	wk.	da.
0	3	1	0	1	3
0	6	1	1		

SAY, IF YOU PUT
THIS ALTOGETHER IT
LOOKS LIKE A CROSS
NUMBER PUZZLE.



wk.	da.
1	3
2	0
+	

A

wk.	da.	wk.	da.	wk.	da.
1	3	1	2		
3	1	1	0		

B

wk.	da.	wk.	da.	wk.	da.
2	3	1	2		
2	1	2	1		

C

wk.	da.	wk.	da.	wk.	da.
1	6	2	5		
4	5	4	4		

D

wk.	da.	wk.	da.	wk.	da.
				6	3
				5	4
6	3	5	4		

All About Nickels and Pennies

E

5¢	1¢	5¢	1¢	5¢	1¢
0	4	1	1	2	0
0	2	2	3		

F

5¢	1¢	5¢	1¢	5¢	1¢
1	3	1	4		
3	4	2	4		

G

5¢	1¢	5¢	1¢	5¢	1¢
4	3	4	3		
5	2	5	2		

H

5¢	1¢	5¢	1¢	5¢	1¢
9			4	17	3
7				22	2
17	3	22	2		

I

min.	sec.	sec.
0	20	20
		40
	0	60
		80
		100
		120
		140
		160
		180
		200
< 60		

II

$\frac{1}{4}$ hr.	min.	min.
0		8
		13
		18
		23
		28
		33
2		38
		53
< 15		

III

$\frac{1}{2}$ hr.	min.	min.
1	9	39
1	19	
1	29	
2	9	
		79
4	9	
< 30		

IV

da.	hrs.	hrs.
		9
		17
		25
		33
		41
		57
		65
		81
< 24		

V

wk.	da.	da.
1	0	
		16
		19
		22
		25
4	6	
< 7		

VI

yr.	mo.	mo.
		8
		14
		20
		26
< 12		

What Are My Rules?

I

10¢	5¢	1¢	cents
			5
			9
1	1	0	
			23
			33
			45
5	1	4	59
			75
			93
11	0	3	
<2		<5	

II

yd.	ft.	in.	in.
			5
			11
0	1	8	20
			32
1	0	11	47
			65
			86
			110
			137
4	1	11	
<3		<12	

III

25¢	5¢	1¢	cents
			9
			19
			34
2	0	4	54
3	0	4	
4	1	4	
			144
			184
			229
11	0	4	
<5		<5	

IV

wk.	da.	da.
		1
		5
		11
		19
		29
5	6	41
		55
10	1	71
		89
		109
<7		

V

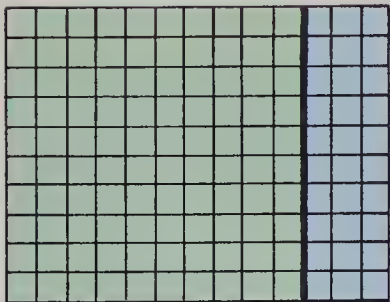
gal.	qt.	$\frac{1}{2}$ pt.	$\frac{1}{2}$ pt.
			1
			3
			6
			10
0	3	3	15
1	1	1	21
1	3	0	
2	1	0	
2			45
3	1	3	
<4		<4	

VI

\$1	10¢	1¢	cents
			4
			16
			34
			58
			88
1	2	4	
1		6	166
2	1		214
	6	8	268
			328
<10		<10	

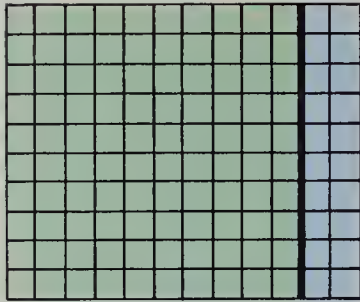
How Many Tiny Squares?

A



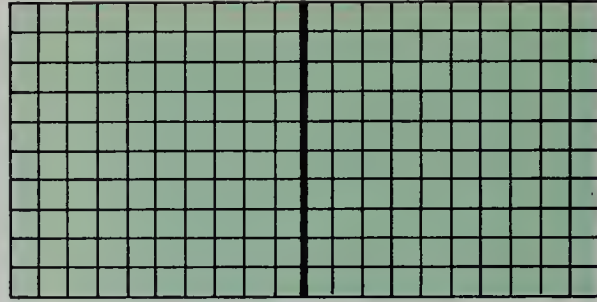
$$13 \times 10 = \underline{\hspace{2cm}}$$

B



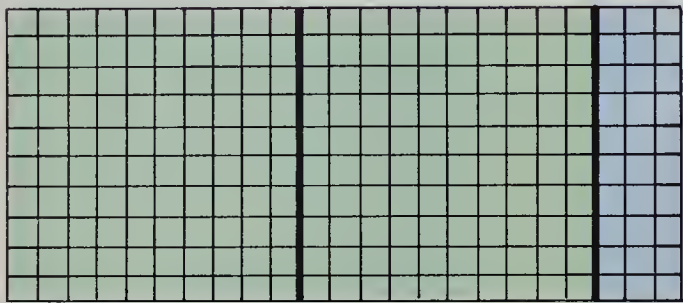
$$12 \times 10 = \underline{\hspace{2cm}}$$

C



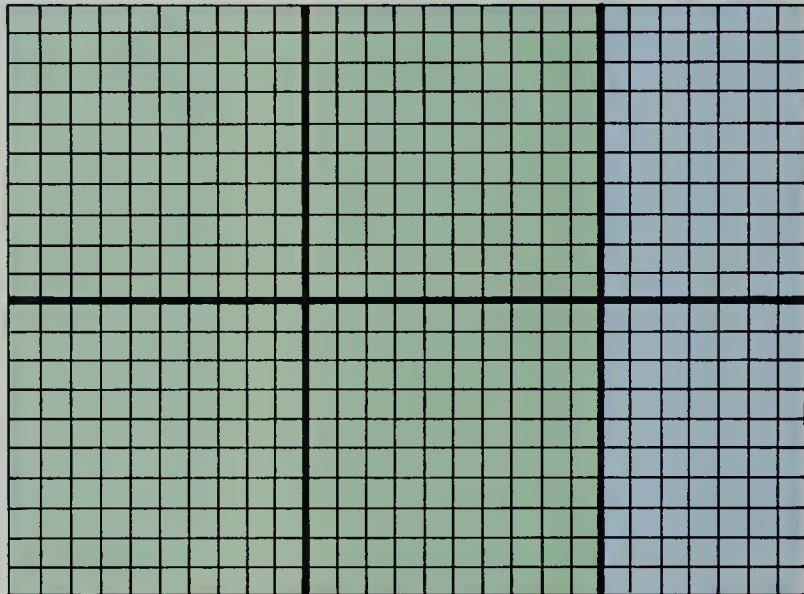
$$20 \times 10 = \underline{\hspace{2cm}}$$

D



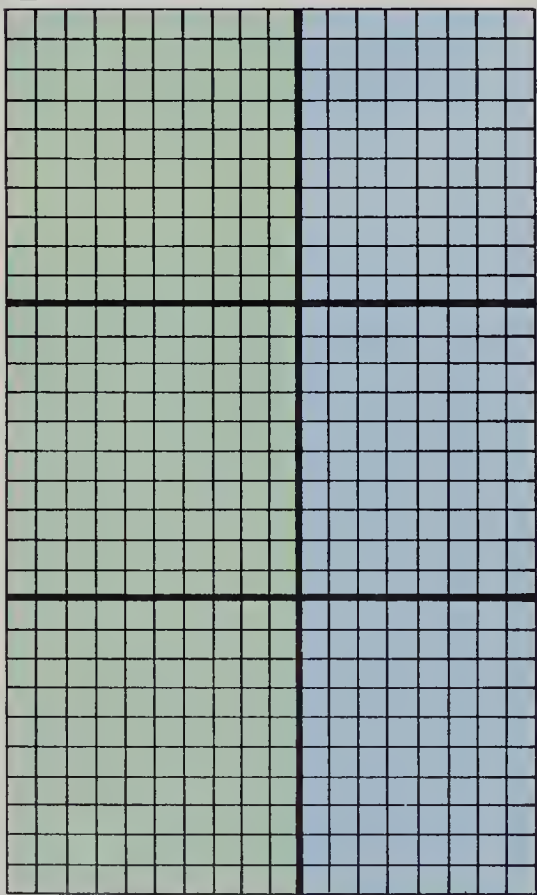
$$23 \times 10 = \underline{\hspace{2cm}}$$

F



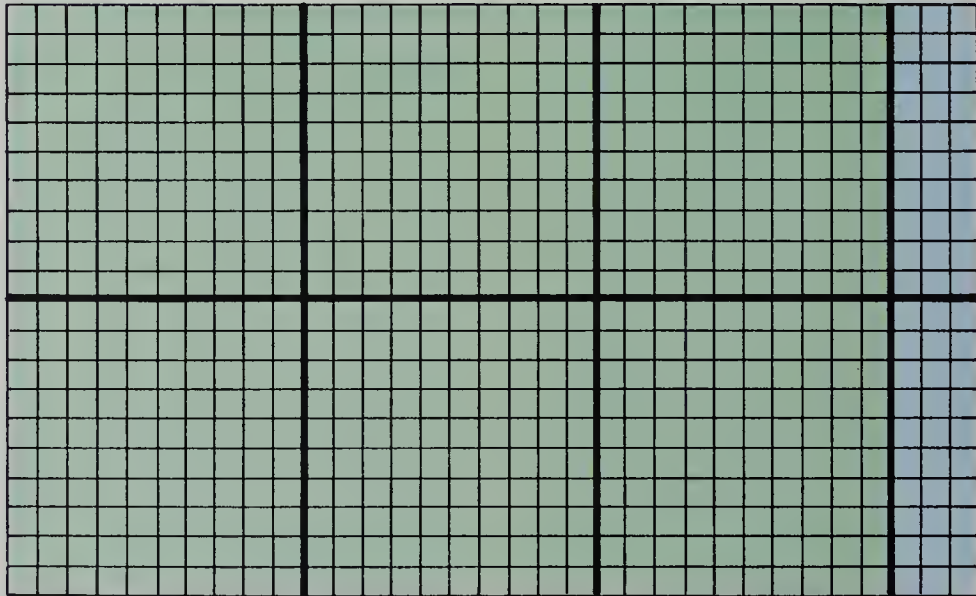
$$27 \times 20 = \underline{\hspace{2cm}}$$

E



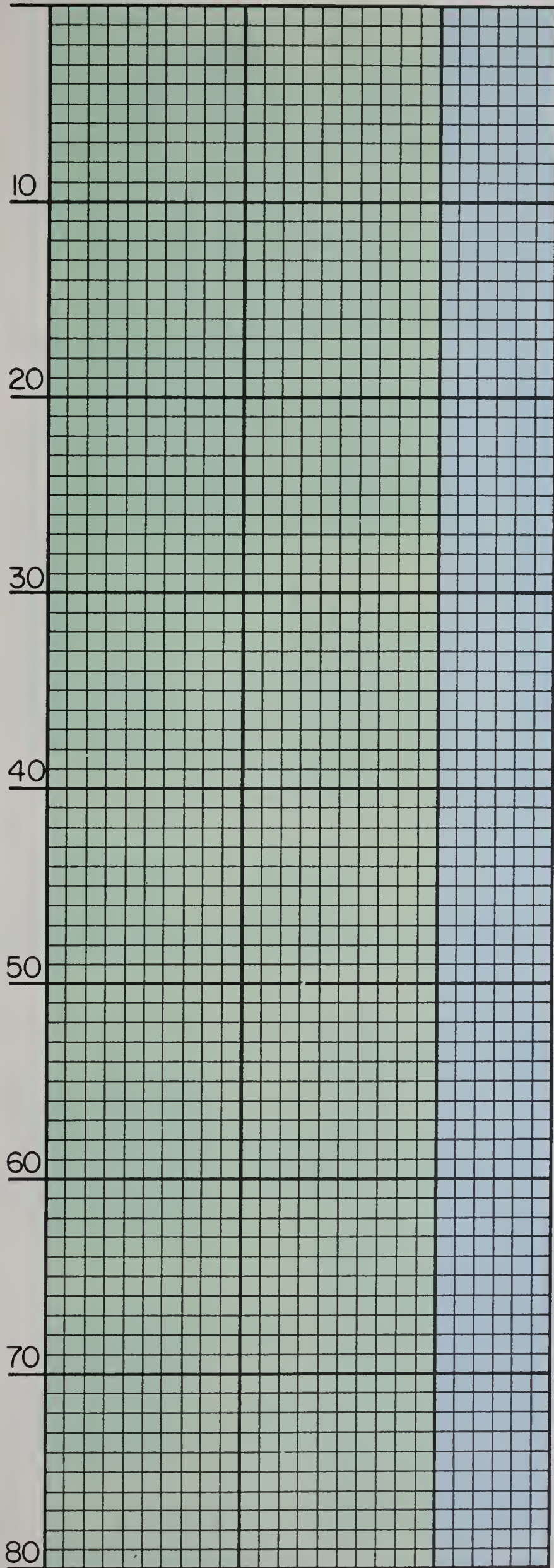
$$18 \times \underline{\hspace{1cm}} = \underline{\hspace{2cm}}$$

G



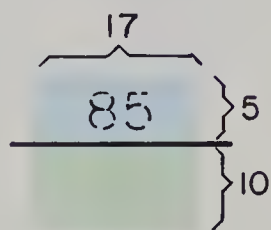
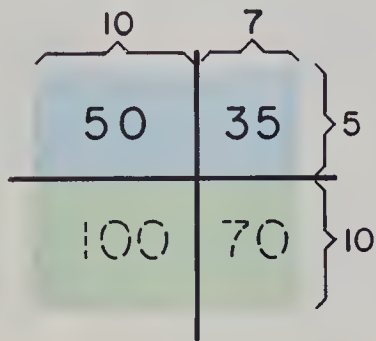
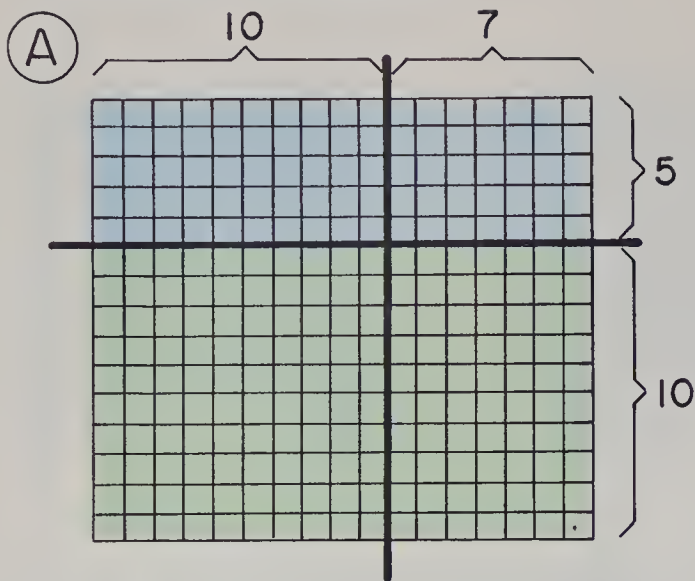
$$33 \times \underline{\hspace{1cm}} = \underline{\hspace{2cm}}$$

- | | | | | | | | |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| a. | b. | c. | d. | e. | f. | g. | h. |
| 13 | 12 | 20 | 23 | 18 | 27 | 33 | 60 |
| <u>x 10</u> | <u>x 10</u> | <u>x 10</u> | <u>x 10</u> | <u>x 30</u> | <u>x 20</u> | <u>x 20</u> | <u>x 20</u> |

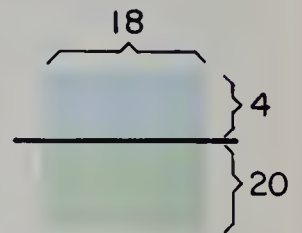
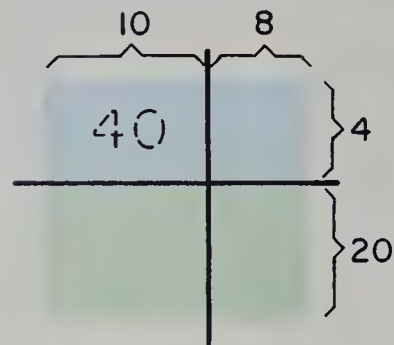
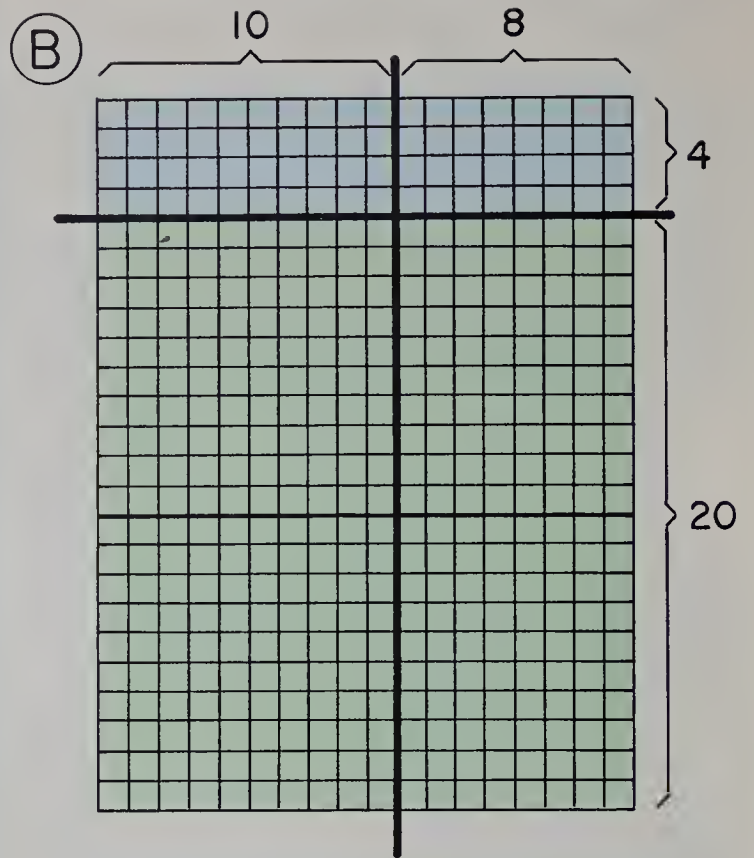
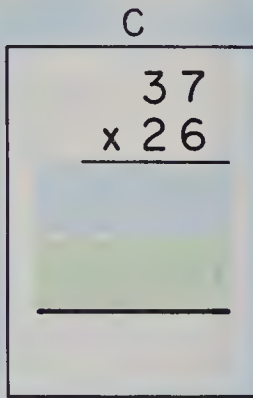
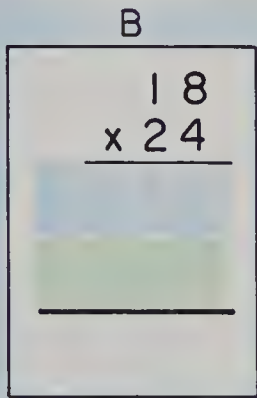
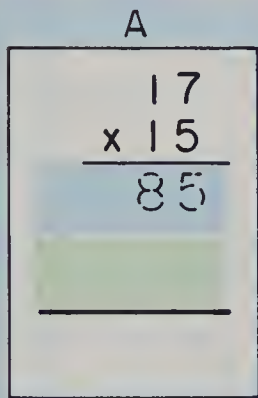


	I	II	III
a.	$\begin{array}{r} 10 \\ \times 10 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ \times 20 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ \times 30 \\ \hline \end{array}$
b.	$\begin{array}{r} 10 \\ \times 50 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ \times 40 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ \times 90 \\ \hline \end{array}$
c.	$\begin{array}{r} 10 \\ \times 60 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ \times 70 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ \times 80 \\ \hline \end{array}$
d.	$\begin{array}{r} 6 \\ \times 10 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ \times 20 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ \times 30 \\ \hline \end{array}$
e.	$\begin{array}{r} 6 \\ \times 50 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ \times 40 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ \times 90 \\ \hline \end{array}$
f.	$\begin{array}{r} 6 \\ \times 60 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ \times 70 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ \times 80 \\ \hline \end{array}$
g.	$\begin{array}{r} 20 \\ \times 10 \\ \hline \end{array}$	$\begin{array}{r} 20 \\ \times 20 \\ \hline \end{array}$	$\begin{array}{r} 20 \\ \times 30 \\ \hline \end{array}$
h.	$\begin{array}{r} 20 \\ \times 50 \\ \hline \end{array}$	$\begin{array}{r} 20 \\ \times 40 \\ \hline \end{array}$	$\begin{array}{r} 20 \\ \times 90 \\ \hline \end{array}$
i.	$\begin{array}{r} 26 \\ \times 10 \\ \hline \end{array}$	$\begin{array}{r} 26 \\ \times 20 \\ \hline \end{array}$	$\begin{array}{r} 26 \\ \times 30 \\ \hline \end{array}$
j.	$\begin{array}{r} 26 \\ \times 50 \\ \hline \end{array}$	$\begin{array}{r} 26 \\ \times 40 \\ \hline \end{array}$	$\begin{array}{r} 26 \\ \times 90 \\ \hline \end{array}$

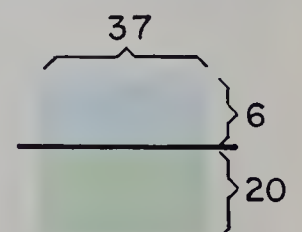
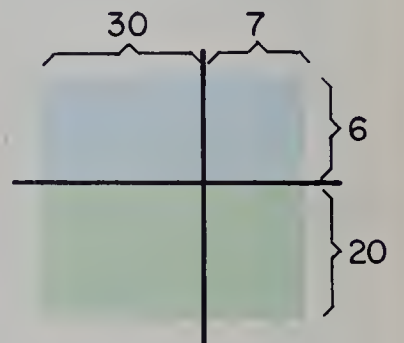
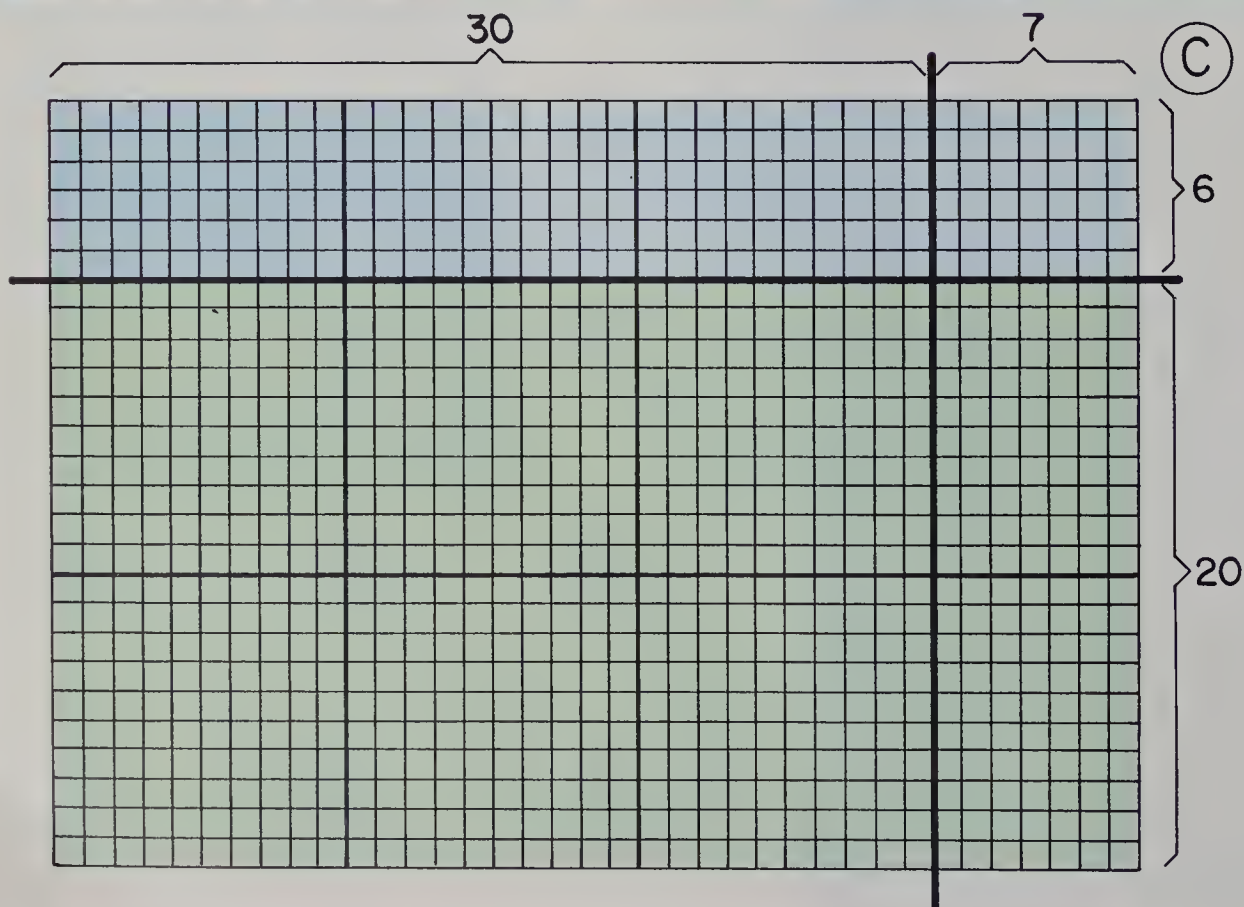
How Many Tiny Squares?



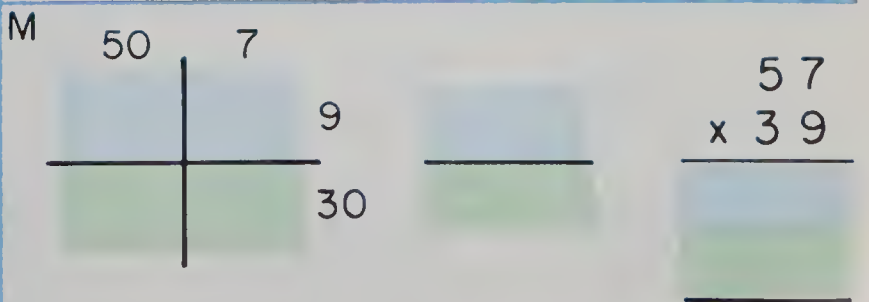
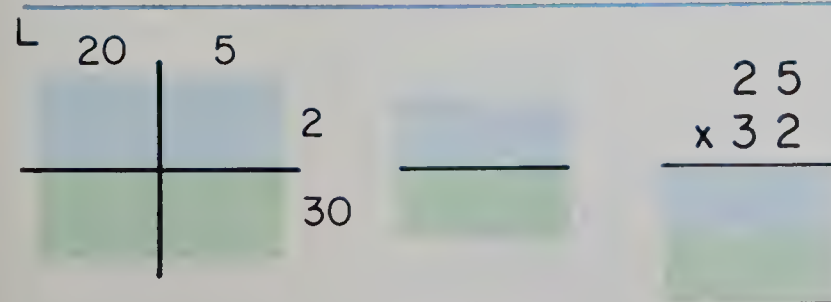
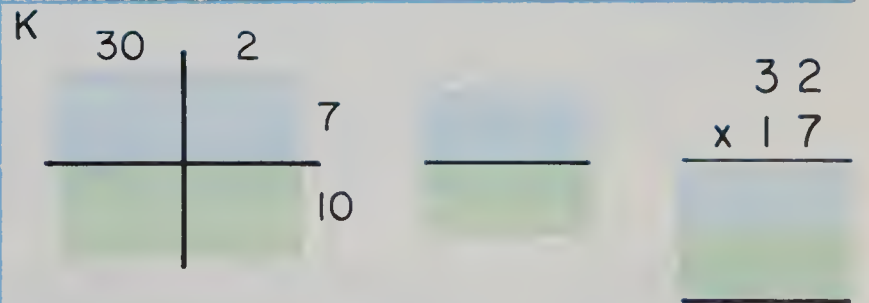
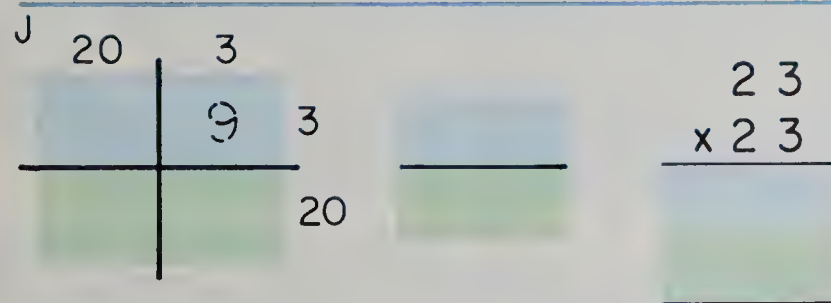
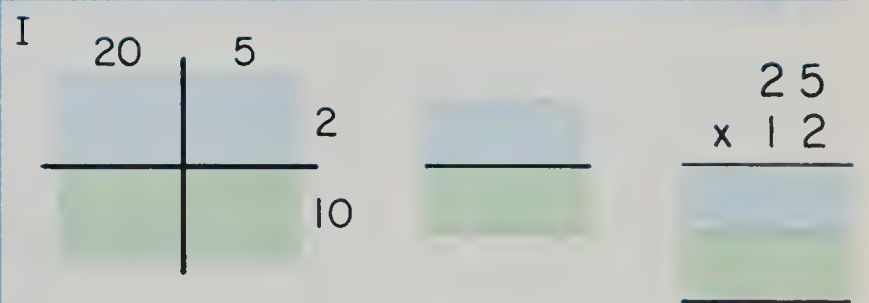
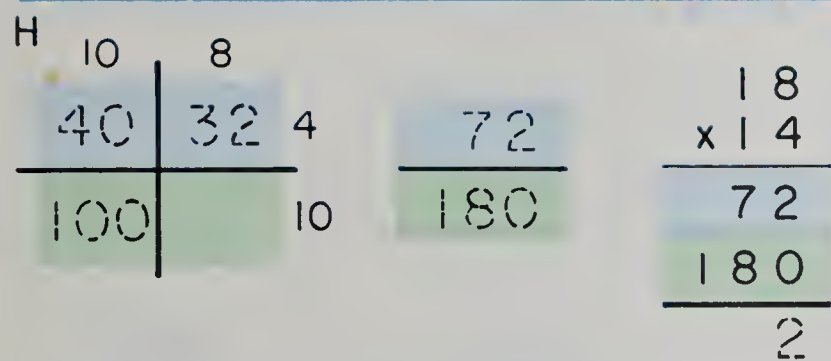
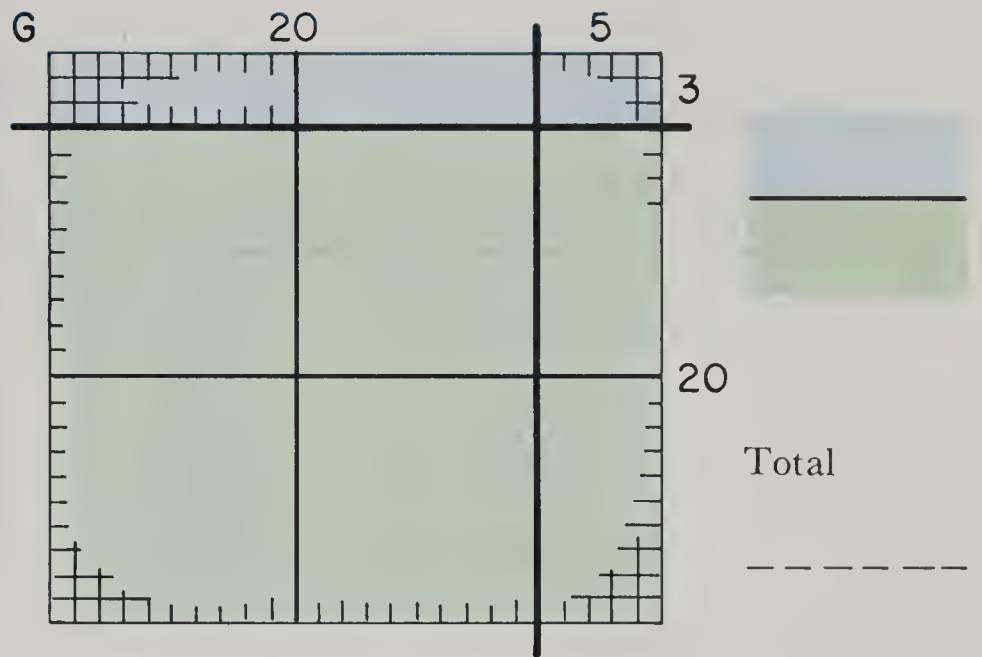
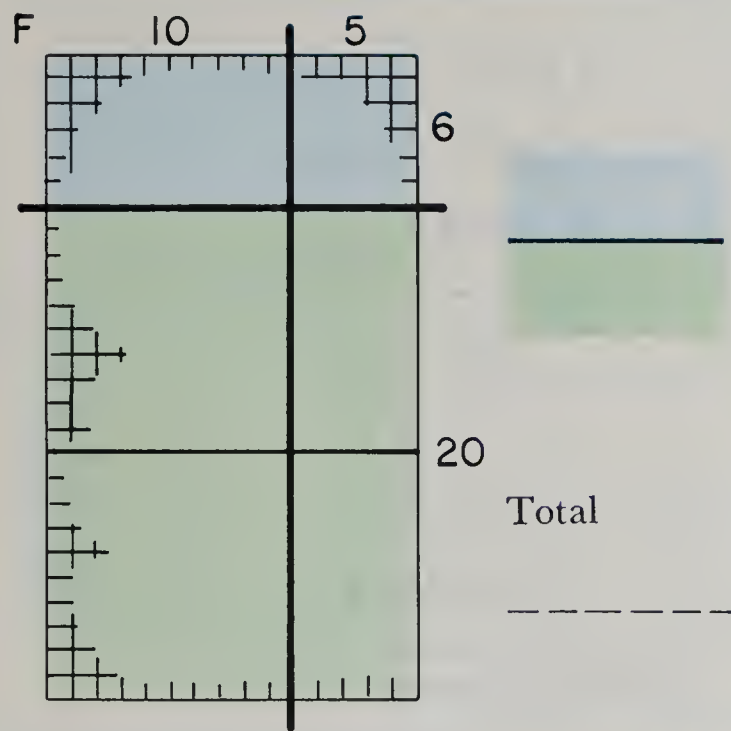
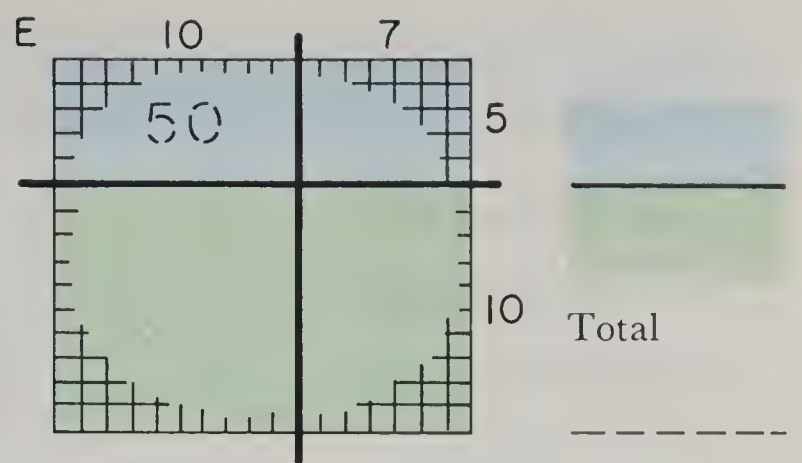
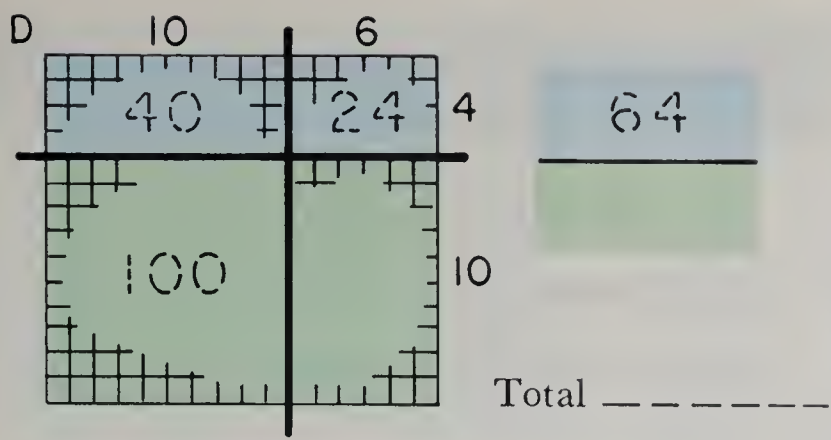
Total _____



Total _____



Total _____



Indicate the largest amount by writing an A in the blue block, the next largest by a

B, the next largest by a C, etc. Compute the differences asked for in each exercise.

- I
seven thousand eighty
seventy-eight hundred
seven thousand eight

difference between

A and B: _____

B and C: _____

A and C: _____

- II
four thousand two hundred
four thousand two
four thousand one hundred two

difference between

A and B: _____

B and C: _____

A and C: _____

- III
7 6 5 4
4 7 6 5
5 4 7 6
6 5 4 7

difference between

A and B: _____

B and D: _____

B and C: _____

C and D: _____

A and C: _____

A and D: _____

- IV
3 2 1 0
3 2 1
1 0 3 2
2 1 0 3

difference between

A and B: _____

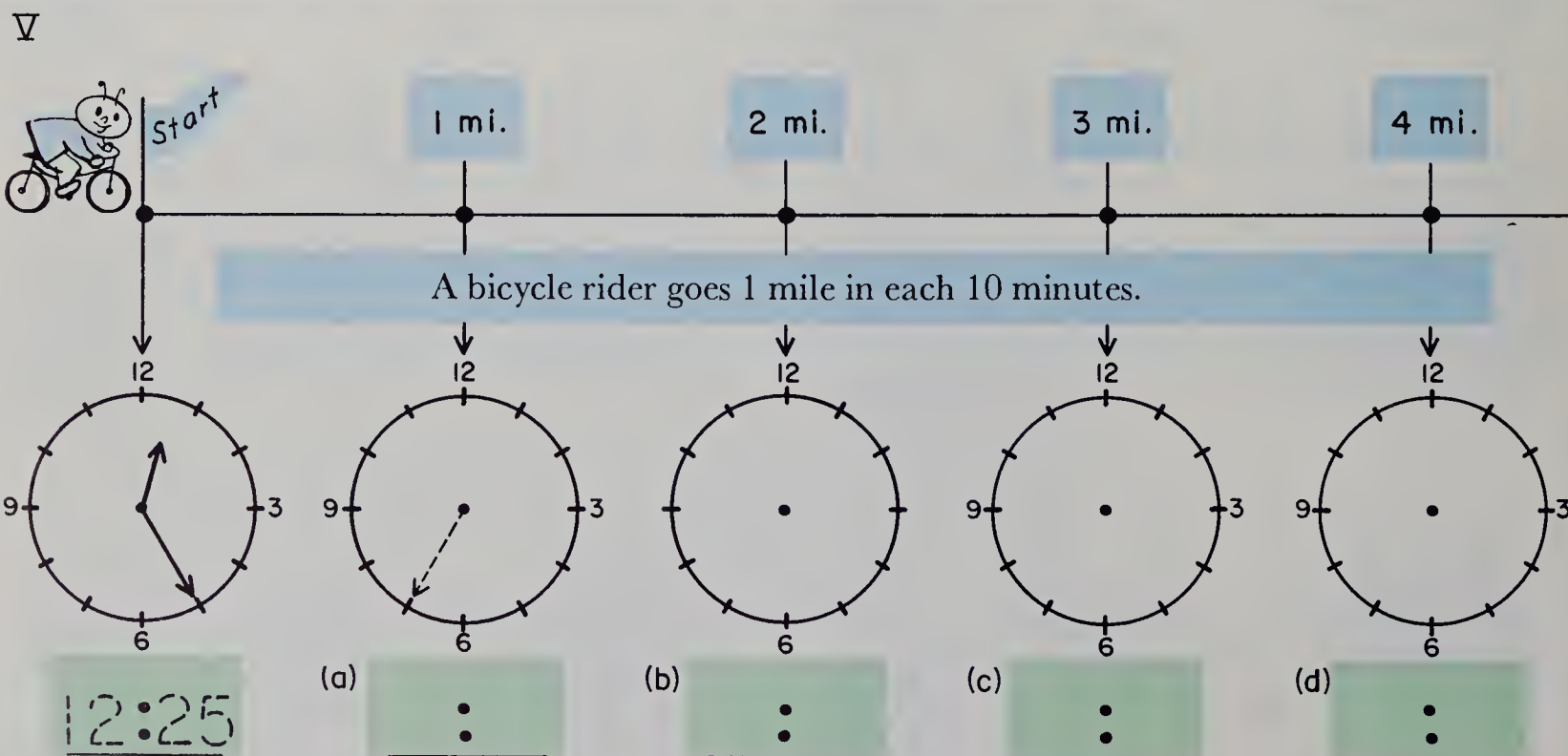
B and D: _____

B and C: _____

C and D: _____

A and C: _____

A and D: _____



(e) He goes _____ miles in 1 hour.

(f) He goes _____ miles in $2\frac{1}{2}$ hours.

Draw a loop around the pair that would make the sentence true.

$$\square \times 3 = 2 \times \bigcirc$$

$$3, 3$$

$$7, 9$$

$$4, 6$$

$$1, 2$$

$$A \quad 4 \times 5 = \triangle + \square - 7$$

$$\triangle 20, \square 3$$

$$\triangle 19, \square 8$$

$$\triangle 9, \square 9$$

$$\triangle 28, \square 35$$

$$B \quad (3 \times \square) + 2 = (5 \times \bigcirc) + 3$$

$$\square 8, \bigcirc 5$$

$$\square 9, \bigcirc 5$$

$$\square 10, \bigcirc 6$$

$$\square 7, \bigcirc 4$$

$$C \quad 4 \times \triangle = (\square \times 7) + 3$$

$$\triangle 6, \square 3$$

$$\triangle 6, \square 4$$

$$\triangle 5, \square 2$$

$$\triangle 10, \square 6$$

$$D \quad \bigcirc \times \triangle = 4 \times 8$$

$$\bigcirc 12, \triangle 12$$

$$\bigcirc 16, \triangle 2$$

$$\bigcirc 4, \triangle 12$$

$$\bigcirc 9, \triangle 3$$

$$E \quad \triangle + \triangle = \square \times \square$$

$$\triangle 5, \square 4$$

$$\triangle 2, \square 2$$

$$\triangle 3, \square 2$$

$$\triangle 1, \square 1$$

$$F \quad \bigcirc \times 8 = (\square \times 10) - 10$$

$$\bigcirc 7, \square 7$$

$$\bigcirc 4, \square 12$$

$$\bigcirc 5, \square 5$$

$$\bigcirc 8, \square 54$$

$$G \quad (\triangle \times 10) - 1 = 7 \times \bigcirc$$

$$\triangle 6, \bigcirc 8$$

$$\triangle 6, \bigcirc 9$$

$$\triangle 3, \bigcirc 4$$

$$\triangle 5, \bigcirc 7$$

$$H \quad (\bigcirc \times 6) - 7 = (\square \times 7) - 13$$

$$\bigcirc 6, \square 6$$

$$\bigcirc 3, \square 4$$

$$\bigcirc 10, \square 9$$

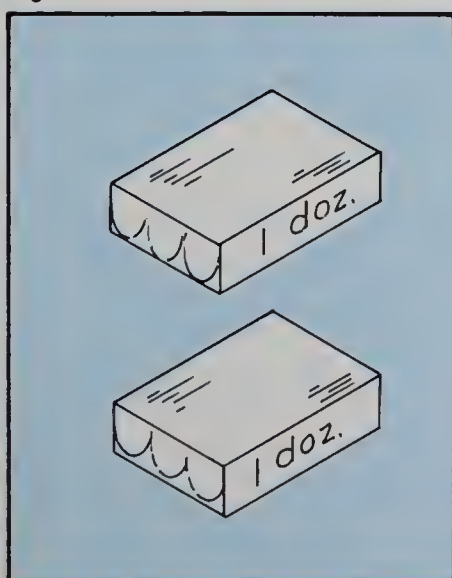
$$\bigcirc 5, \square 5$$

I



twice as much	28¢	4 times as much	\$.
3 times as much	¢	6 times as much	\$.
5 times as much	¢	10 times as much	\$.
8 times as much	¢	16 times as much	\$.
13 times as much	¢	26 times as much	\$.
21 times as much	¢	42 times as much	\$.
half as much	¢	68 times as much	\$.

J



number of eggs	24	3 times as many	
half as many		twice as many	
one-fourth as many		5 times as many	
one-third as many		10 times as many	
a half-dozen more		15 times as many	
a half-dozen less		25 times as many	
a doz. and a half less		40 times as many	

What Are My Rules?

A

				How many?	+ 10
				26	
+ 30	- 20	x 2	x 1	x 3	
56					

B

				How many?	- 9
- 20	- 30	- 29	- 39	+ 40	
	9				

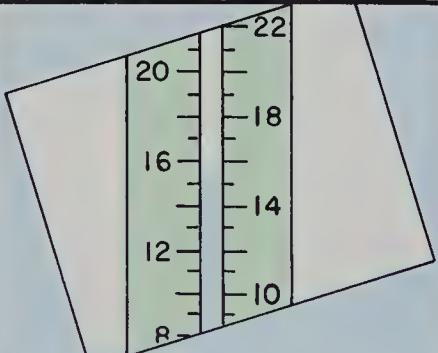
C

A	B	C	D	E	twice as many		4 times as many	
F	G	H	I	J				
K	L	M	N	O	3 times as many		5 times as many	
P	Q	R	S	T				
U	V	W	X	Y				

D

	2 times as much		4 times as much	
	3 times as much		6 times as much	
	5 times as much		10 times as much	

E


temperature shown

7° colder

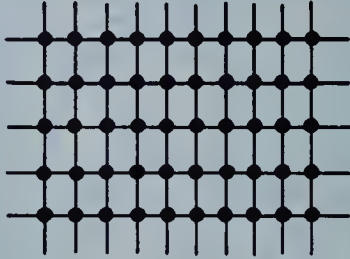
7° warmer

15° colder

F


time shown
⋮
20 minutes later
⋮
20 minutes earlier
⋮
2½ hours later
⋮

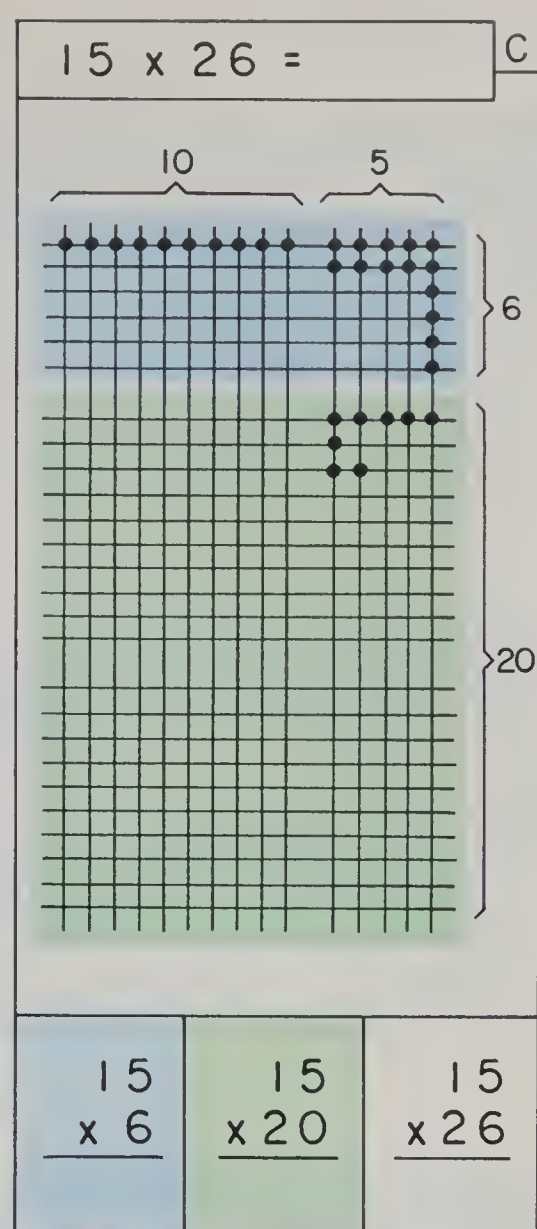
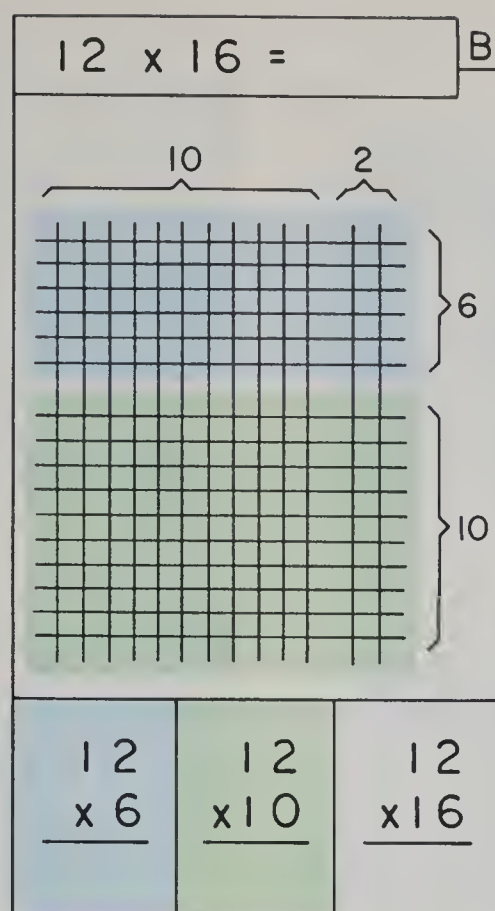
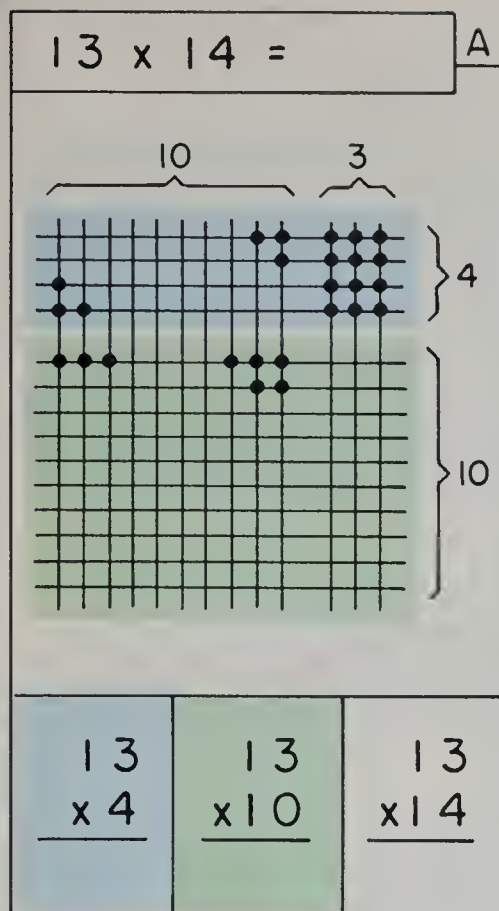
G


number of crossing points

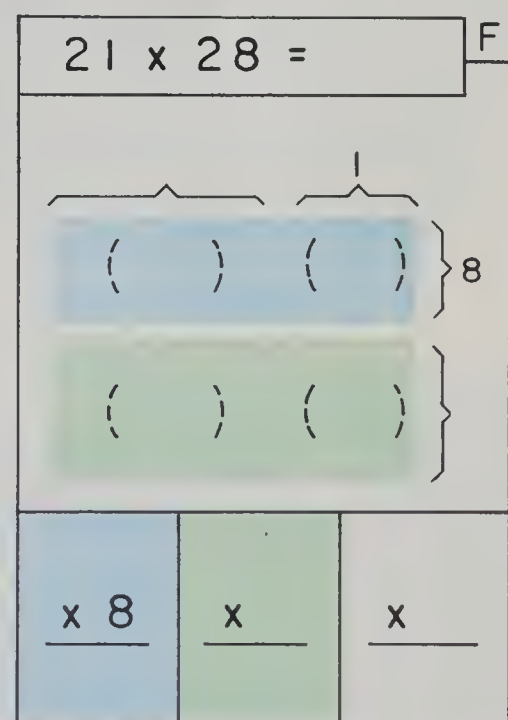
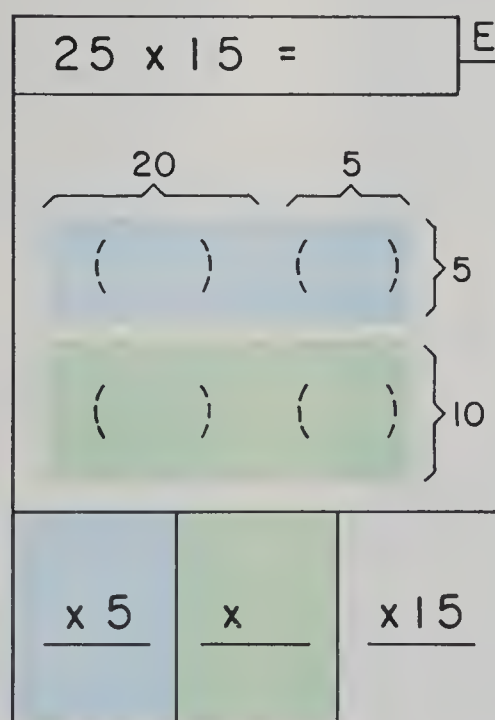
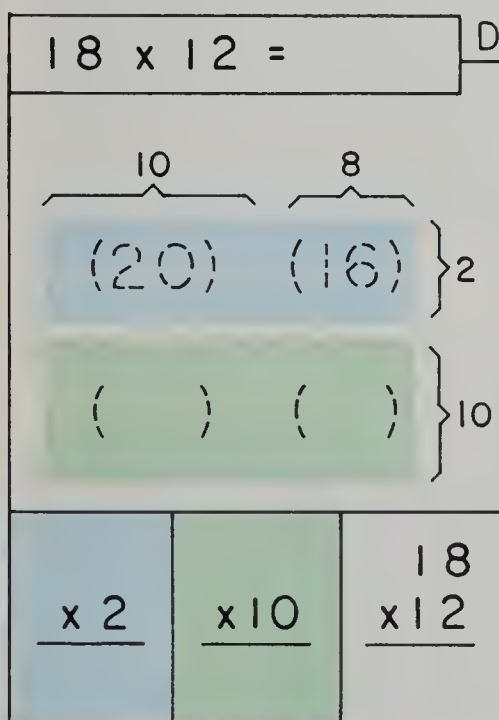
twice the number

half the number

10 times the number



Sketches like these can become very large and hard to draw. Let's use diagrams that suggest large sketches.

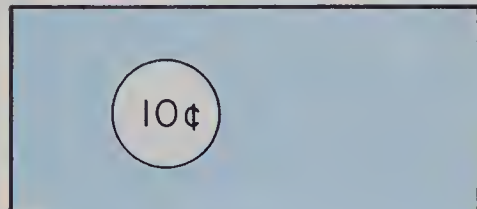


G

	6 times as many dollar bills	\$.	12 times as many dollar bills	\$.
	6 times as many dimes	\$.	12 times as many dimes	\$.
	6 times as many pennies	\$.	12 times as many pennies	\$.
	6 times as much as \$1.23	\$.	12 times as much as \$1.23	\$.

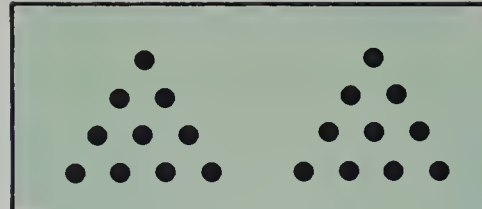
What Are My Rules?

A



			How much?	+ 5¢
			10¢	
+ 10¢	+ 20¢	- 5¢	- 10¢	+ 25¢

B



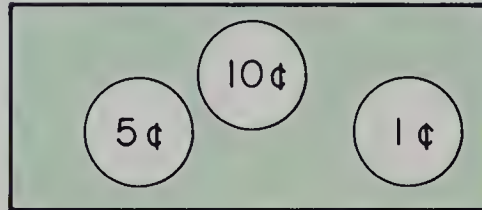
			How many?	twice as many
half as many	+ 20	- 20	- 15	+ 18

C



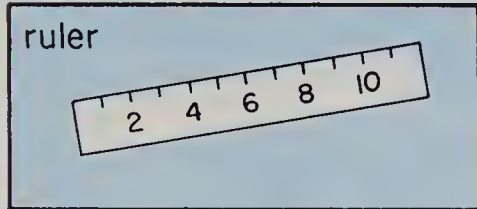
			double	+ 25
- 23	+ 50	+ 65	- 8	twice as many

D



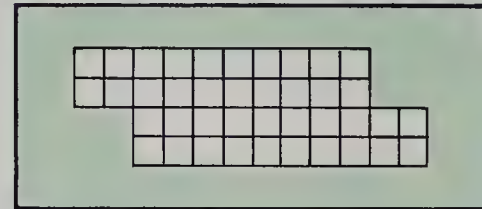
			How much?	twice as much
half as much	+ 15¢	+ 50¢	- 16¢	- 4¢

E



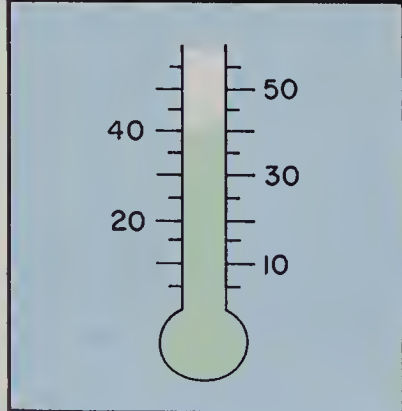
			total length	half as long
			in.	
twice as long	+ 6 in.	- 11 in.	+ 12 in.	+ 1 ft.

F



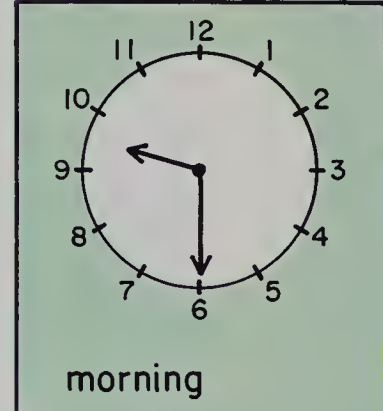
			double	- 20
+ 26	- 15	- 40	+ 60	half as many

G



temperature shown	
up 32°	
down 32°	45° colder
45° warmer	60° warmer

H



time shown	
10 minutes later	
10 minutes earlier	2 hours later
2 hours ago	2½ hours ago

Sometimes we need ways to suggest very large sketches.
These sketches would include hundreds of crossing points.

A $132 \times 3 =$

100 30 2

(300) (90) (6) } 3

100 x 3	30 x 3	2 x 3	132 x 3
------------	-----------	----------	------------

B $256 \times 4 =$

200 50 6

() () () } 4

	50 x 4	6 x 4	256 x 4
--	-----------	----------	------------

C $317 \times 5 =$

() () () }

	10 x 5	7 x 5	317 x 5
--	-----------	----------	------------

D $196 \times 7 =$

() () () }

100 x 7			196 x 7
------------	--	--	------------

If you need sketches for the following examples, use a piece of scratch paper.

E $214 \times 9 =$

x	x	x	x

F $305 \times 8 =$

	0		
x 8	x 8	x 8	x

G $\times =$

x	x	x	x 6
			1416

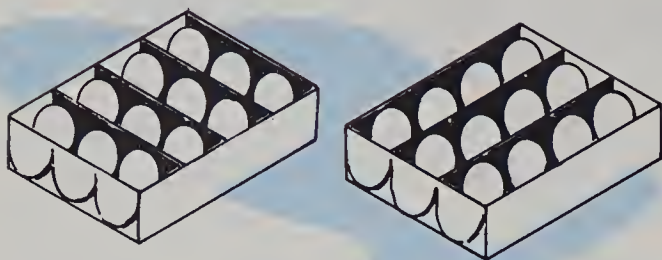
H $\times 9 = 1836$

x	x	x	x

I

5 x	8	7	5	20	8	10	300	318				
	40								15	350	500	865

Here are two ways we can think about a dozen eggs:



On the left we see 4 groups of 3 eggs. On the right, we see 3 groups of 4 eggs.

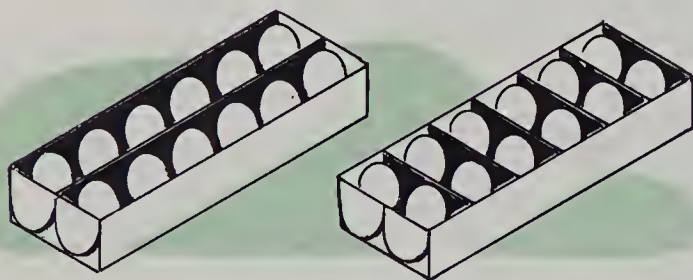
Or, we might say that 12 eggs can be divided into 3 groups of 4 eggs, or into 4 groups of 3 eggs.

This suggests the following mathematical sentences:

$$3 \times 4 = \underline{\quad\quad\quad} \quad 4 \times 3 = \underline{\quad\quad\quad}$$

$$12 \div 3 = \underline{\quad\quad\quad} \quad 12 \div 4 = \underline{\quad\quad\quad}$$

Here are two other ways of thinking about a dozen eggs:



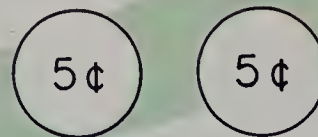
These ways of thinking about a dozen eggs suggest these mathematical sentences:

$$2 \times 6 = \underline{\quad\quad\quad} \quad 6 \times 2 = \underline{\quad\quad\quad}$$

$$12 \div 6 = \underline{\quad\quad\quad} \quad 12 \div 2 = \underline{\quad\quad\quad}$$

We might also notice that there are 6 eggs in two dozen eggs.

If we think about 10¢ as two nickels:

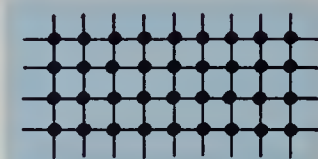


this might suggest the following mathematical sentences:

$$2 \times \underline{\quad} = 10 \quad \underline{\quad} \times 2 = \underline{\quad}$$

$$\underline{\quad} \div 2 = \underline{\quad} \quad \underline{\quad} \div \underline{\quad} = 2$$

Thinking about lines and crossing points, this sketch:



suggests the following:

$$\underline{\quad} \times 9 = \underline{\quad} \quad 9 \times \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} \div 9 = \underline{\quad} \quad \underline{\quad} \div \underline{\quad} = 9$$

Another way of writing down this idea is:

$$\begin{array}{r} 9 \\ 4 \overline{)36} \end{array} \quad \text{or:} \quad \begin{array}{r} 4 \\ 9 \overline{)36} \end{array}$$

These are usually read: "36 divided by 4 equals 9" and "36 divided by 9 equals 4." But you could also think of them as saying:

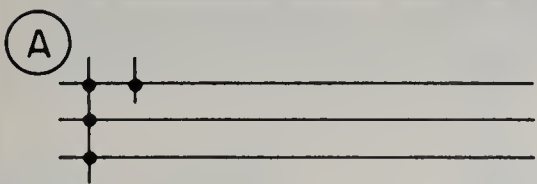
$$4 \times 9 = 36 \quad \text{and:} \quad 9 \times 4 = 36$$

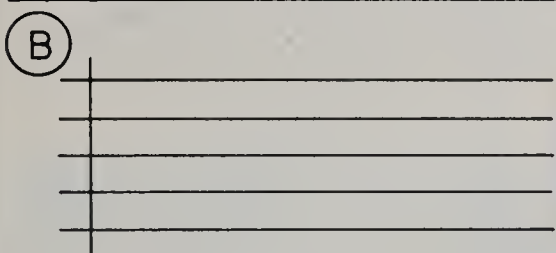
Thinking of lines and crossing points, the problem:

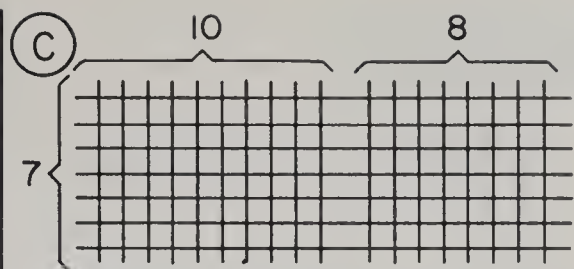
$$\begin{array}{r} \\ 4 \overline{)20} \end{array}$$

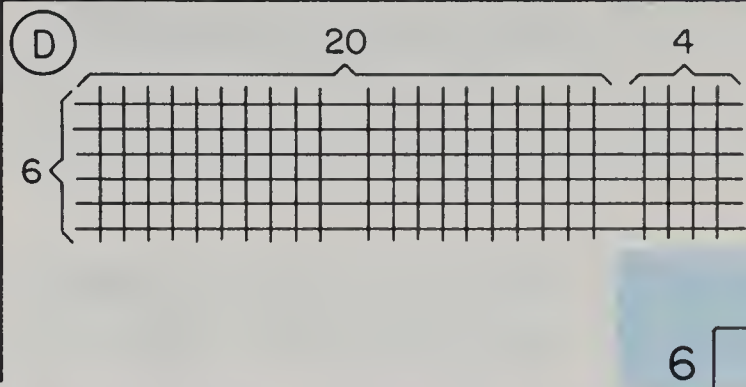
asks the question: "If there are 20 crossing points on 4 horizontal lines, how many vertical lines must there be?" 5

Please finish the following mathematical statements and the sketches they might suggest.

(A)  $3 \overline{)27}$

(B)  $5 \overline{)11}$

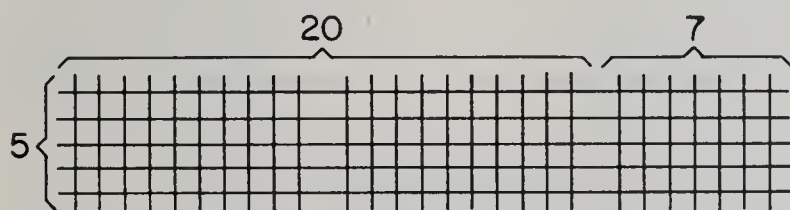
(C)  $7 \overline{) }$

(D)  $6 \overline{) }$

We might describe sketches C and D more fully in this way:

(C)
$$\begin{array}{r} 10 + 8 \\ 7 \overline{) 70 + 56} \end{array} \quad \text{and} \quad (D) \quad \begin{array}{r} 20 + 4 \\ 6 \overline{) 120 + 24} \end{array}$$

Please describe the following sketch in a similar way:



E
$$\begin{array}{r} + 7 \\ 5 \overline{) + } \end{array}$$

Since the sketches take up much space and are hard to draw, let's imagine them. When in doubt, draw the sketch on a piece of scratch paper.

F
$$\begin{array}{r} + \\ 3 \overline{) 30 + 6} \end{array}$$

G
$$\begin{array}{r} + 5 \\ 5 \overline{) 100 + } \end{array}$$

H
$$\begin{array}{r} 20 + 3 \\ 4 \overline{) + } \end{array}$$

I
$$\begin{array}{r} 30 + 6 \\ \overline{) + 12} \end{array}$$

J
$$\begin{array}{r} + 7 \\ 8 \overline{) 160 + } \end{array}$$

K
$$\begin{array}{r} 40 + 6 \\ 7 \overline{) + } \end{array}$$

L
$$\begin{array}{r} 10 + 5 \\ 3 \overline{) + } \end{array}$$

M
$$\begin{array}{r} 10 + \\ 9 \overline{) + 45} \end{array}$$

N
$$\begin{array}{r} 20 + 6 \\ 5 \overline{) + } \end{array}$$

O
$$\begin{array}{r} 20 + \\ 7 \overline{) + 63} \end{array}$$

P
$$\begin{array}{r} 10 + 8 \\ 8 \overline{) + } \end{array}$$

Q
$$\begin{array}{r} 30 + 7 \\ 9 \overline{) + } \end{array}$$

R
$$\begin{array}{r} 40 + \\ 4 \overline{) + 32} \end{array}$$

S
$$\begin{array}{r} 20 + \\ 6 \overline{) + 54} \end{array}$$

T
$$\begin{array}{r} 10 + 3 \\ 12 \overline{) + } \end{array}$$

U
$$\begin{array}{r} + 4 \\ 25 \overline{) 250 + } \end{array}$$

V
$$\begin{array}{r} + \\ 15 \overline{) 300 + 60} \end{array}$$

W
$$\begin{array}{r} + 9 \\ 11 \overline{) 330 + } \end{array}$$

X
$$\begin{array}{r} 30 + 7 \\ 20 \overline{) + } \end{array}$$

Y
$$\begin{array}{r} 10 + 0 \\ 13 \overline{) + } \end{array}$$

Z
$$\begin{array}{r} + 3 \\ \overline{) 240 + 36} \end{array}$$

a
$$\begin{array}{r} 30 + 8 \\ \overline{) + 72} \end{array}$$

All About 144

Rule A: The blue-tinted blocks are reserved for whole numbers less than 10.

0, 1, 2, 3, 4, 5, 6, 7, 8 and 9

Rule B: The green-tinted blocks are for multiples of 10.

0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120 190, 200, 210 etc.

(You may wish to think of these examples as referring to sketches with 144 crossing points.)

A

$$\begin{array}{r} \text{+} \\ 2 \overline{) 140 + 4} \\ \hline \end{array}$$

B

$$\begin{array}{r} \text{+} \quad 8 \\ 3 \overline{) \quad \quad \quad} \\ \hline \end{array}$$

C

$$\begin{array}{r} \text{+} \\ 6 \overline{) \quad \quad \quad} \\ \hline \end{array}$$

D

$$\begin{array}{r} \text{+} \quad 4 \\ 1 \overline{) 140 + 4} \\ \hline \end{array}$$

E

$$\begin{array}{r} \text{+} \\ 12 \overline{) \quad \quad \quad} \\ \hline \end{array}$$

F

$$\begin{array}{r} \text{+} \\ 72 \overline{) 0 \quad \quad} \\ \hline \end{array}$$

G

$$\begin{array}{r} \text{+} \\ 8 \overline{) \quad \quad \quad} \\ \hline \end{array}$$

H

$$\begin{array}{r} \text{+} \quad 6 \\ \quad \overline{) 0 \quad \quad} \\ \hline \end{array}$$

I

$$\begin{array}{r} \text{+} \quad 3 \\ \quad \overline{) \quad \quad \quad} \\ \hline \end{array}$$

J

$$\begin{array}{r} \text{+} \\ 4 \overline{) \quad \quad \quad} \\ \hline \end{array}$$

K

$$\begin{array}{r} \text{+} \quad 1 \\ \quad \overline{) \quad \quad \quad} \\ \hline \end{array}$$

L

$$\begin{array}{r} \text{+} \quad 4 \\ \quad \overline{) 0 \quad \quad} \\ \hline \end{array}$$

M

$$\begin{array}{r} \text{+} \\ 9 \overline{) \quad \quad \quad} \\ \hline \end{array}$$

N

$$\begin{array}{r} \text{+} \\ 16 \overline{) \quad \quad \quad} \\ \hline \end{array}$$

All About 216

Follow the same rules — A and B — used in the column on the left.

O

$$\begin{array}{r} \text{+} \\ 2 \overline{) \quad \quad \quad} \\ \hline \end{array}$$

P

$$\begin{array}{r} \text{+} \\ 4 \overline{) \quad \quad \quad} \\ \hline \end{array}$$

Q

$$\begin{array}{r} \text{+} \\ 6 \overline{) \quad \quad \quad} \\ \hline \end{array}$$

R

$$\begin{array}{r} \text{+} \\ 3 \overline{) \quad \quad \quad} \\ \hline \end{array}$$

S

$$\begin{array}{r} \text{+} \\ 9 \overline{) \quad \quad \quad} \\ \hline \end{array}$$

T

$$\begin{array}{r} \text{+} \\ 12 \overline{) \quad \quad \quad} \\ \hline \end{array}$$

U

$$\begin{array}{r} \text{+} \\ 18 \overline{) \quad \quad \quad} \\ \hline \end{array}$$

V

$$\begin{array}{r} \text{+} \\ 8 \overline{) \quad \quad \quad} \\ \hline \end{array}$$

All About 324

Keep following rules A and B.

W

$$\begin{array}{r} \text{+} \\ 4 \overline{) \quad \quad \quad} \\ \hline \end{array}$$

X

$$\begin{array}{r} \text{+} \\ 3 \overline{) \quad \quad \quad} \\ \hline \end{array}$$

Y

$$\begin{array}{r} \text{+} \\ 2 \overline{) \quad \quad \quad} \\ \hline \end{array}$$

Z

$$\begin{array}{r} \text{+} \\ 6 \overline{) \quad \quad \quad} \\ \hline \end{array}$$

a

$$\begin{array}{r} \text{+} \\ 12 \overline{) \quad \quad \quad} \\ \hline \end{array}$$

b

$$\begin{array}{r} \text{+} \\ 9 \overline{) \quad \quad \quad} \\ \hline \end{array}$$

c

$$\begin{array}{r} \text{+} \\ 18 \overline{) \quad \quad \quad} \\ \hline \end{array}$$

d

$$\begin{array}{r} \text{+} \\ 27 \overline{) \quad \quad \quad} \\ \hline \end{array}$$

Work rapidly. KEEP LOOKING FOR TIME-SAVERS.

a.

$$3 \overline{) 30}$$

$$3 \overline{) 15}$$

$$3 \overline{) 45}$$

b.

$$4 \overline{) 80}$$

$$4 \overline{) 16}$$

$$4 \overline{) 96}$$

c.

$$5 \overline{) 100}$$

$$5 \overline{) 75}$$

$$5 \overline{) \begin{array}{r} 35 \\ \end{array}}$$

d.

$$8 \overline{) \begin{array}{r} 20 \\ \end{array}}$$

$$8 \overline{) 32}$$

$$8 \overline{) 192}$$

e.

$$12 \overline{) 120}$$

$$12 \overline{) 60}$$

$$12 \overline{) \begin{array}{r} 15 \\ \end{array}}$$

f.

$$6 \overline{) 300}$$

g.

$$9 \overline{) 180}$$

h.

$$7 \overline{) \begin{array}{r} 30 \\ \end{array}}$$

i.

$$9 \overline{) \begin{array}{r} 30 \\ \end{array}}$$

j.

$$15 \overline{) 300}$$

k.

$$8 \overline{) 480}$$

$$6 \overline{) 54}$$

$$9 \overline{) \begin{array}{r} 7 \\ \end{array}}$$

$$7 \overline{) 42}$$

$$9 \overline{) 72}$$

$$15 \overline{) \begin{array}{r} 7 \\ \end{array}}$$

$$8 \overline{) 56}$$

$$6 \overline{) 354}$$

$$9 \overline{) \begin{array}{r} 27 \\ \end{array}}$$

$$7 \overline{) 252}$$

$$9 \overline{) 342}$$

$$15 \overline{) \begin{array}{r} 27 \\ \end{array}}$$

$$8 \overline{) 536}$$

l.

$$7 \overline{) 700}$$

m.

$$5 \overline{) 1000}$$

n.

$$8 \overline{) 800}$$

o.

$$4 \overline{) 1200}$$

p.

$$9 \overline{) \begin{array}{r} 200 \\ \end{array}}$$

q.

$$7 \overline{) \begin{array}{r} 1000 \\ \end{array}}$$

$$7 \overline{) 70}$$

$$5 \overline{) 150}$$

$$8 \overline{) 240}$$

$$4 \overline{) 200}$$

$$9 \overline{) \begin{array}{r} 70 \\ \end{array}}$$

$$7 \overline{) \begin{array}{r} 50 \\ \end{array}}$$

$$7 \overline{) 21}$$

$$5 \overline{) \begin{array}{r} 9 \\ \end{array}}$$

$$8 \overline{) 40}$$

$$4 \overline{) 36}$$

$$9 \overline{) \begin{array}{r} 6 \\ \end{array}}$$

$$7 \overline{) \begin{array}{r} 7 \\ \end{array}}$$

$$7 \overline{) 791}$$

$$5 \overline{) \begin{array}{r} 239 \\ \end{array}}$$

$$8 \overline{) 1080}$$

$$4 \overline{) 1436}$$

$$9 \overline{) \begin{array}{r} 276 \\ \end{array}}$$

$$7 \overline{) \begin{array}{r} 1057 \\ \end{array}}$$

Rules of the
MONEY GAME:

Sign of
the game:

\$

- A. First digit to the left of the period indicates dollars.
- B. First digit to the right of the period indicates dimes.
- C. Second digit to the right of the period indicates pennies.
- D. Digits allowed are: 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9.

a. \$ 1.00 + \$ 2.00 = \$ 3.00

b. \$ 1.10 + \$ 1.20 = \$.

c. \$ 0.80 + \$ 0.20 = \$.

d. \$ 0.50 + \$ 0.75 = \$.

e. \$ 1.47 + \$ 4.37 = \$.

f. \$ 4.00 - \$ 1.00 = \$.

g. \$ 2.00 - \$ 0.70 = \$.

h. \$ 2.50 - \$ 0.75 = \$.

i. \$ 3.20 - \$ 1.25 = \$.

j. \$ 7.36 - \$ 3.59 = \$.

We can use the same rules when we multiply and divide in the Money Game.

k. 2 x \$ 2.15 = \$ 4.30

l. \$ 1.50 x 3 = \$.

m. 5 x \$ 0.20 = \$.

n. \$ 1.25 x 4 = \$.

o. 3 x \$ 2.41 = \$.

p. \$ 4.30 ÷ 2 = \$.

q. \$ 3.00 ÷ 2 = \$.

r. \$ 3.39 ÷ 3 = \$.

s. \$ 1.20 ÷ 3 = \$.

t. \$ 2.19 ÷ 3 = \$.

u.
$$\begin{array}{r} \$ 1.05 \\ \times 3 \\ \hline \$. \end{array}$$

v.
$$\begin{array}{r} \$ 2.25 \\ \times 4 \\ \hline \$ \end{array}$$

w.
$$\begin{array}{r} \$ 0.55 \\ \times 2 \\ \hline \$ \end{array}$$

x.
$$\begin{array}{r} \$ 1.38 \\ \times 3 \\ \hline \$ \end{array}$$

A.
$$\begin{array}{r} \$. \\ 3 \overline{) \$ 3.24} \end{array}$$

B.
$$\begin{array}{r} \$. \\ 2 \overline{) \$ 5.00} \end{array}$$

C.
$$\begin{array}{r} \$. \\ 2 \overline{) \$ 0.18} \end{array}$$

D.
$$\begin{array}{r} \$. \\ 5 \overline{) \$ 2.50} \end{array}$$

E.
$$\begin{array}{r} \$. \\ 3 \overline{) \$ 1.17} \end{array}$$

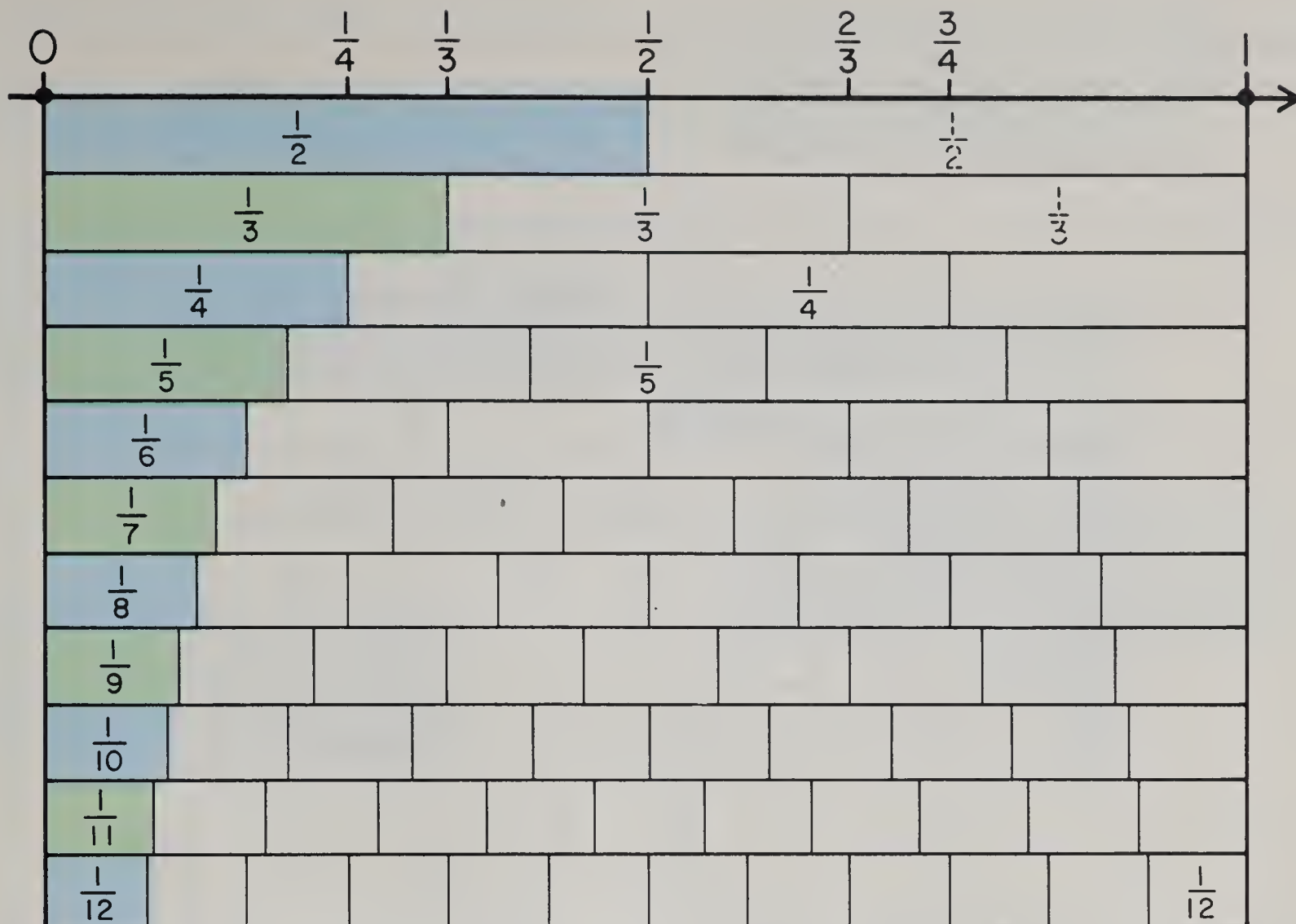
F.
$$\begin{array}{r} \$. \\ 5 \overline{) \$ 8.35} \end{array}$$

G.
$$\begin{array}{r} \$. \\ 4 \overline{) \$ 9.72} \end{array}$$

H.
$$\begin{array}{r} \$. \\ 6 \overline{) \$ 7.26} \end{array}$$

y. 6 x \$ 1.29 = \$.

z. \$ 1.83 x 5 = \$.



Make TRUE sentences.

$=$ is equal to

$<$ is less than

$>$ is greater than

A

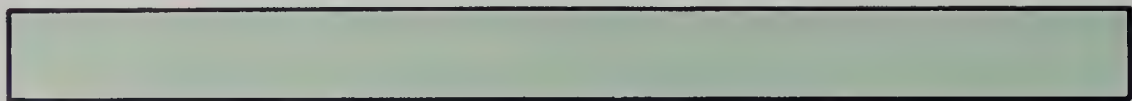
B

C

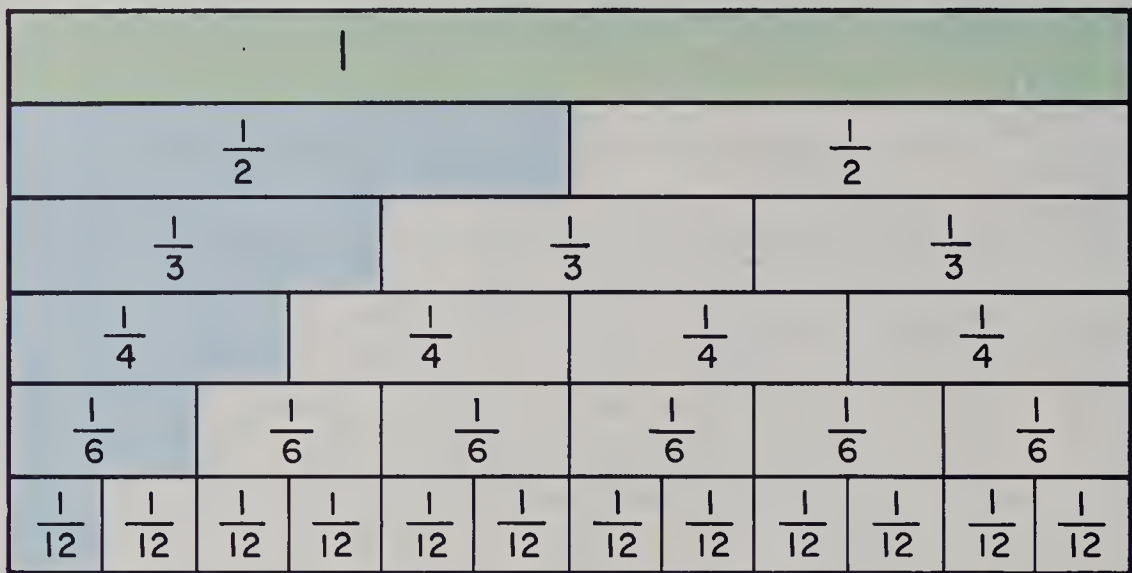
D

I	$\frac{1}{3} < \frac{1}{2}$	$\frac{1}{2} > \frac{2}{3}$	$\frac{3}{8} > \frac{3}{10}$	$\frac{1}{2} = \frac{2}{4} = \frac{3}{6} > \frac{5}{10}$
II	$\frac{1}{8} > \frac{1}{10}$	$\frac{2}{5} > \frac{1}{4}$	$\frac{6}{12} > \frac{6}{11}$	$\frac{3}{7} > \frac{3}{8} > \frac{3}{9} > \frac{3}{10}$
III	$\frac{1}{4} > \frac{1}{6}$	$\frac{2}{4} > \frac{1}{2}$	$\frac{3}{4} > \frac{4}{5}$	$\frac{2}{3} > \frac{3}{4} > \frac{4}{5} > \frac{5}{6}$
IV	$\frac{1}{11} > \frac{1}{10}$	$\frac{2}{12} > \frac{1}{3}$	$\frac{5}{6} > \frac{4}{7}$	$\frac{2}{6} > \frac{1}{3} > \frac{3}{9} > \frac{5}{12}$
V	$\frac{1}{6} > \frac{1}{7}$	$\frac{3}{9} > \frac{2}{3}$	$\frac{9}{11} > \frac{2}{3}$	$\frac{2}{7} > \frac{1}{4} > \frac{3}{12} > \frac{2}{8}$
VI	$\frac{1}{2} > \frac{1}{4}$	$\frac{3}{5} > \frac{1}{2}$	$\frac{6}{12} > \frac{1}{2}$	$\frac{5}{12} > \frac{4}{10} > \frac{2}{5} > \frac{4}{9}$

If we agree that the area inside the heavy black line suggests 1

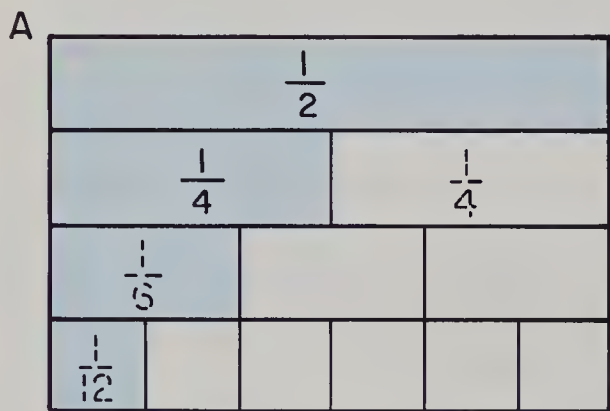


THEN the blocks in the drawing below can suggest the following:



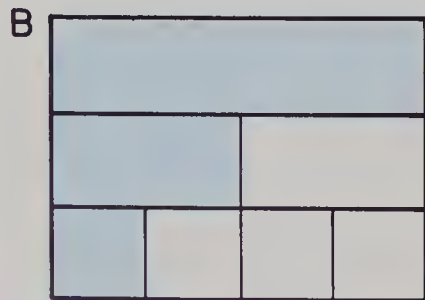
This sketch suggests the idea that $1 = \frac{2}{2} = \frac{3}{3} = \frac{4}{4} = \frac{6}{6} = \frac{12}{12}$.

We notice that the area of some groups of blocks is the same as that of some single blocks.



This sketch suggests that

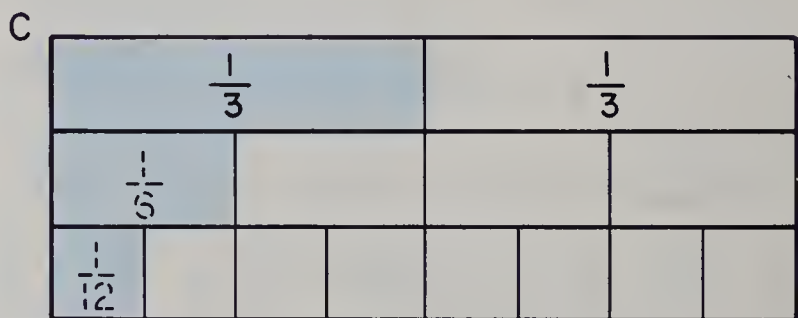
$$\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \frac{5}{10} = \frac{6}{12}$$



This sketch suggests that

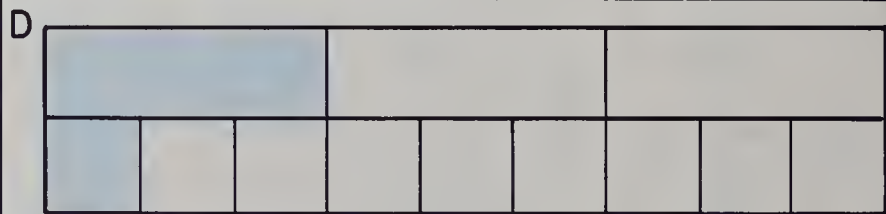
$$\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \frac{5}{10} = \frac{6}{12}$$

We notice that the area of some groups of blocks is the same as that of other groups.



This suggests that

$$\frac{2}{3} = \frac{4}{6} = \frac{8}{12}$$



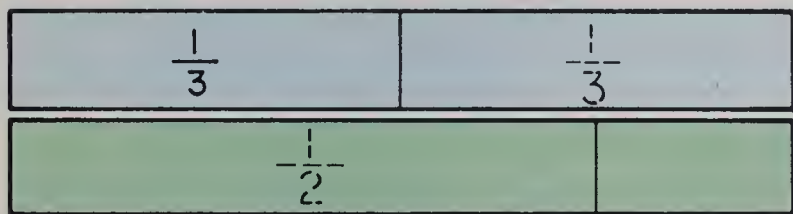
This suggests that

$$\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \frac{5}{10} = \frac{6}{12}$$

We also notice that the large sketch at the top of the page suggests that $\frac{5}{6} = \frac{10}{12}$.

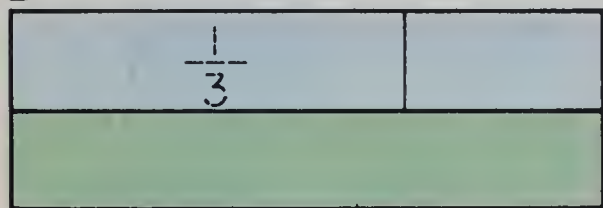
Some combinations of blocks have the same area as that of other combinations or as that of single blocks. Please note the mathematical facts suggested by the sketches.

A



$$\frac{2}{3} = \frac{1}{2} + \frac{1}{6} \quad \frac{2}{3} - \frac{1}{6} = \frac{1}{2}$$

B



$$\frac{1}{3} + \frac{1}{6} = \frac{1}{2} \quad \frac{1}{2} - \frac{1}{6} = \frac{1}{3}$$

$$\frac{1}{3} + \frac{1}{6} = \frac{1}{2} \quad \frac{1}{2} - \frac{1}{6} = \frac{1}{3}$$

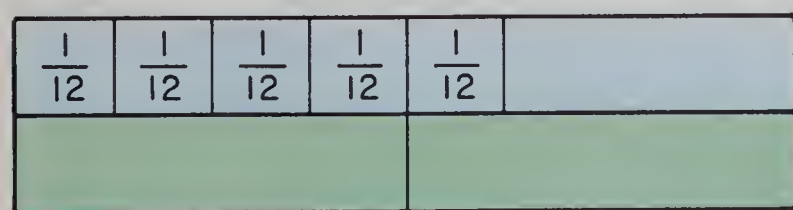
C



$$\frac{1}{12} + \frac{1}{12} = \frac{1}{6} \quad \frac{1}{6} + \frac{1}{12} = \frac{1}{4}$$

$$\frac{1}{6} - \frac{1}{12} = \frac{1}{12} \quad \frac{1}{4} - \frac{1}{12} = \frac{1}{6}$$

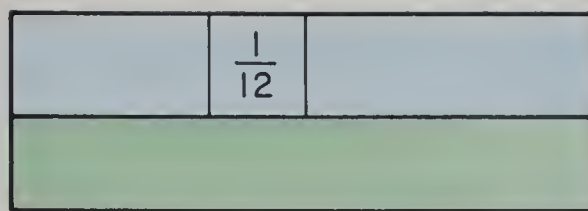
D



$$\frac{5}{12} + \frac{1}{12} = \frac{1}{2} \quad \frac{1}{2} + \frac{1}{12} = \frac{7}{12}$$

$$\frac{5}{12} - \frac{1}{12} = \frac{1}{2} \quad \frac{7}{12} - \frac{1}{12} = \frac{1}{2}$$

E



$$\frac{1}{4} + \frac{1}{12} = \frac{1}{3} \quad \frac{1}{4} - \frac{1}{12} = \frac{1}{6}$$

F



$$\frac{1}{4} + \frac{1}{4} = \frac{1}{2} \quad \frac{1}{2} - \frac{1}{4} = \frac{1}{4}$$

$$\frac{1}{4} + \frac{1}{4} = \frac{1}{2} \quad \frac{1}{2} - \frac{1}{4} = \frac{1}{4}$$

G



$$\frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4} \quad \frac{3}{4} - \frac{1}{4} = \frac{1}{2}$$

Please complete the following as similar sketches would suggest:

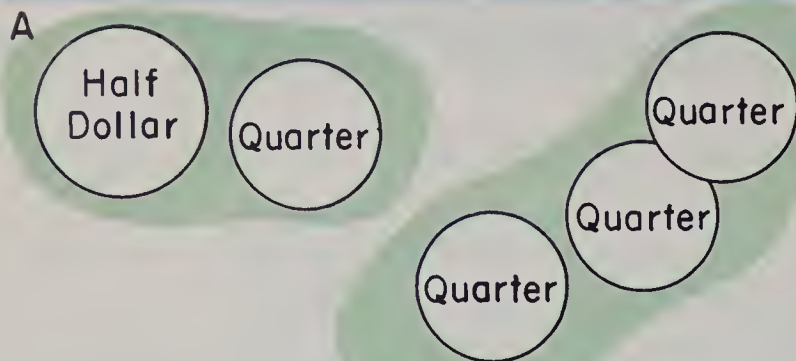
H $\frac{1}{2} - \frac{1}{12} = \frac{5}{12}$ I $\frac{7}{12} + \frac{1}{12} = \frac{8}{12} = \frac{2}{3}$

J $\frac{1}{3} + \frac{1}{2} = \frac{5}{6}$ K $\frac{1}{4} + \frac{1}{3} = \frac{7}{12}$

L $\frac{2}{3} + \frac{1}{12} = \frac{9}{12} = \frac{3}{4}$ M $\frac{3}{4} - \frac{2}{3} = \frac{1}{12}$

N $\frac{1}{4} + \frac{5}{12} = \frac{8}{12} = \frac{2}{3}$ O $\frac{2}{3} - \frac{1}{2} = \frac{1}{6}$

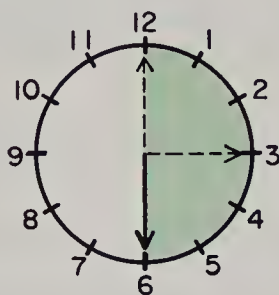
Familiar ideas—and the arithmetic they suggest.



A half-dollar and a quarter buy just as much as _____ quarters.

$$\frac{1}{2} + \frac{1}{4} = \frac{3}{4} \quad \text{or} \quad \frac{1}{4} + \frac{1}{2} = \frac{3}{4}$$

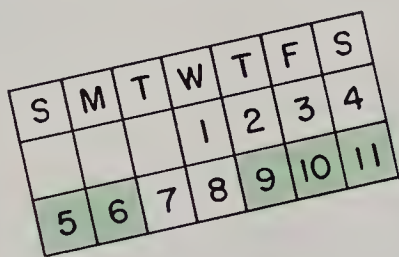
B Two quarters of an hour:



Two quarters of an hour is _____ hour.

$$\frac{1}{4} + \frac{1}{4} = \frac{1}{2} \quad \text{and} \quad \frac{1}{2} - \frac{1}{4} = \frac{1}{4}$$

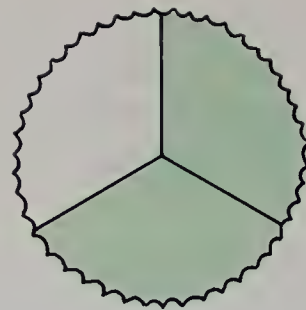
C A day is one seventh of a week.



Two sevenths of a week and three sevenths of a week are the same as _____ sevenths of a week.

$$\frac{2}{7} + \frac{3}{7} = \frac{5}{7} \quad \text{or} \quad \frac{3}{7} + \frac{2}{7} = \frac{5}{7}$$

D

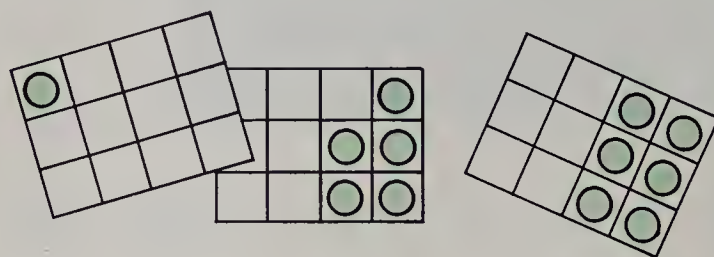


One third of a pie and another third of a pie together are _____ thirds of a pie.

$$\frac{1}{3} + \frac{1}{3} = \frac{2}{3} \quad \text{and} \quad \frac{2}{3} - \frac{1}{3} = \frac{1}{3}$$

E

One egg is one twelfth of a dozen eggs.

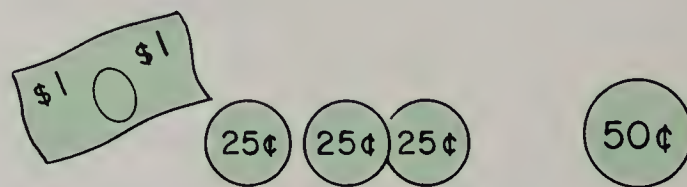


One twelfth of a dozen and five twelfths of a dozen is the same as _____ twelfths of a dozen or _____ half-dozen.

$$\frac{1}{12} + \frac{5}{12} = \frac{6}{12} = \frac{1}{2}$$

F

A half-dollar added to a dollar and three quarters ...



is as much as two dollars and _____ quarter.

$$1 \frac{3}{4} + \frac{1}{2} = 2 \frac{1}{4} \quad \text{or} \quad 1 \frac{1}{2} + 1 \frac{3}{4} = 2 \frac{5}{4}$$

G $\frac{3}{4} - \frac{1}{2} = \frac{1}{4}$

I $\frac{1}{2} + \frac{1}{12} = \frac{7}{12}$

K $1 - \frac{1}{2} = \frac{1}{2}$

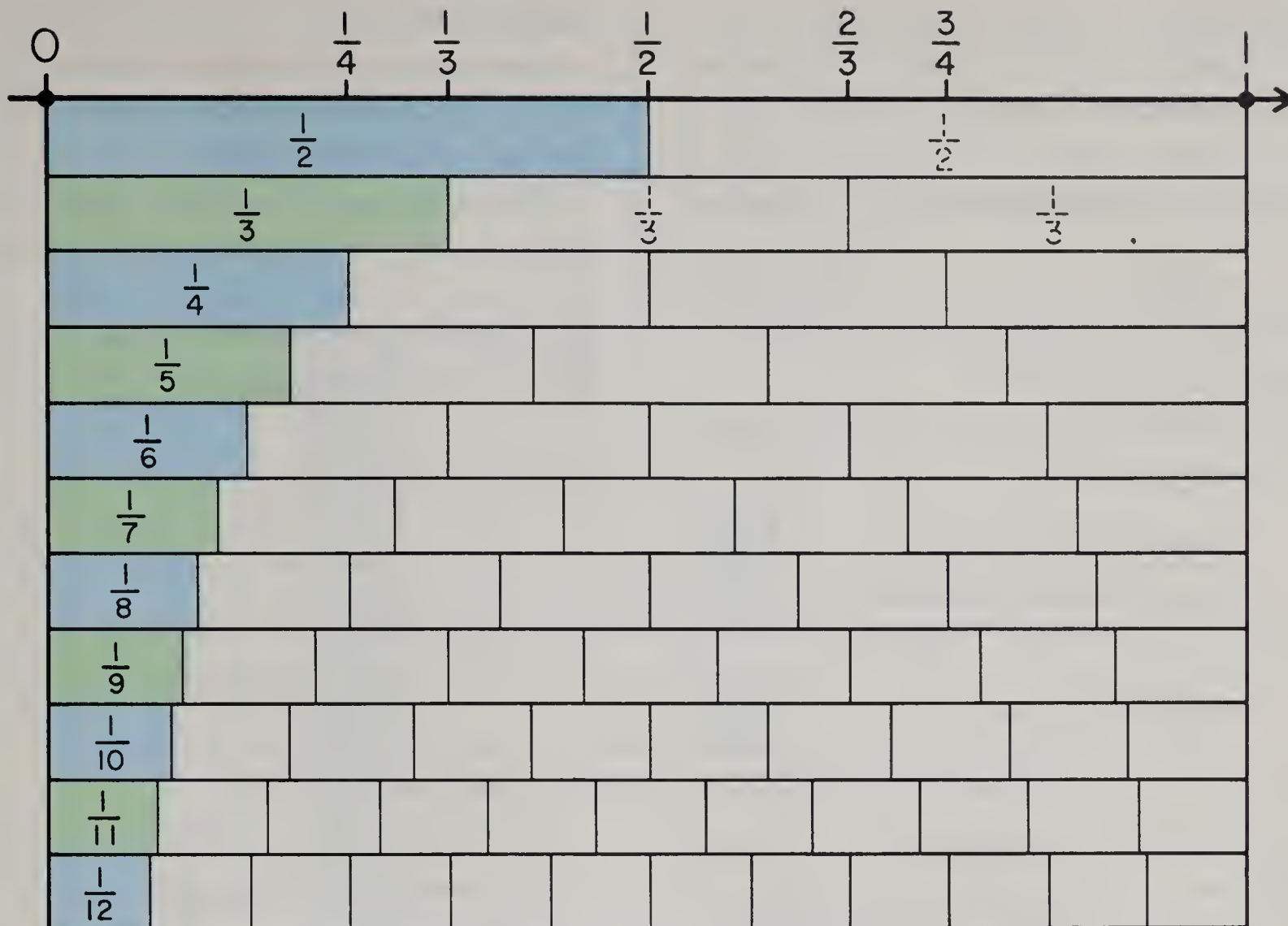
M $1 - \frac{1}{4} = \frac{3}{4}$

H $\frac{3}{4} - \frac{1}{4} = \frac{1}{2}$

J $\frac{1}{2} - \frac{1}{12} = \frac{5}{12}$

L $2 - \frac{1}{2} = \frac{3}{2}$

N $97 - \frac{1}{4} = 96 \frac{3}{4}$



Make TRUE sentences.

$=$ is equal to $<$ is less than $>$ is greater than

A

B

C

D

I	$\frac{5}{6}$ $\square$ $\frac{6}{7}$	$\frac{2}{5}$ $\square$ $\frac{3}{7}$	$\frac{5}{11}$ $\square$ $\frac{1}{2}$	$\frac{2}{3}$ $\square$ $\frac{5}{7}$
II	$\frac{1}{2} + \frac{1}{2}$ $\square$ $\frac{1}{3} + \frac{1}{3}$	$\frac{1}{2} - \frac{1}{2}$ $\square$ $\frac{1}{3} - \frac{1}{3}$	$\frac{1}{3} + \frac{2}{3}$ $\square$ $\frac{1}{2} + \frac{3}{4}$	$\frac{2}{5} + \frac{3}{5}$ $\square$ $\frac{1}{2} + \frac{2}{3}$
III	$\frac{1}{3} + \frac{1}{2}$ $\square$ $\frac{1}{2} + \frac{1}{3}$	$\frac{1}{3} + \frac{1}{3}$ $\square$ $\frac{1}{2} - \frac{1}{3}$	$\frac{3}{4} - \frac{1}{2}$ $\square$ $\frac{1}{4} + \frac{1}{4}$	$\frac{3}{4} + \frac{3}{4}$ $\square$ $\frac{2}{5} + \frac{3}{5}$
IV	$\frac{5}{6} - \frac{1}{3}$ $\square$ $\frac{1}{8} + \frac{3}{8}$	$\frac{1}{9} + \frac{1}{9}$ $\square$ $\frac{2}{12} + \frac{1}{12}$	$\frac{7}{12} + \frac{5}{12}$ $\square$ $\frac{3}{8} + \frac{5}{8}$	$\frac{2}{7} + \frac{1}{6}$ $\square$ $\frac{1}{5} + \frac{2}{5}$
V	$2 + \frac{1}{3}$ $\square$ $2 + \frac{1}{4}$	$2 + \frac{3}{4}$ $\square$ $3 - \frac{1}{2}$	$3 + \frac{7}{12}$ $\square$ $\frac{7}{12} + 3$	$\frac{1}{2} + \frac{1}{2}$ $\square$ $2 - \frac{1}{2}$
VI	$\frac{2}{3} + \frac{3}{4}$ $\square$ $\frac{2}{4} + \frac{3}{3}$	$\frac{1}{2} + \frac{1}{3}$ $\square$ $\frac{1}{5} + \frac{3}{5}$	$\frac{1}{2} + \frac{1}{2}$ $\square$ $\frac{1}{2} + \frac{1}{2}$	$\frac{2}{3} + \frac{1}{3}$ $\square$ $\frac{1}{3} + \frac{1}{3}$

Bill had some marbles. He had less than 40. He decided to keep three out of every four marbles and give the rest to his brother, Jim, who had no marbles.

He arranged them in groups of four and had none left over.

- Could Bill have ended up with 51 marbles?
- Could Jim get as many as 20 from Bill?
- Who would have more?
- Could Bill and Jim end up with the same

number of marbles?

How many did Bill have in the beginning? How many after the division? How many did Jim have after the division?

We can't answer these last questions but there are only a certain number of possibilities. Let's make a chart to see how many these are. Start with the smallest number Bill could have had in the beginning.

Number Bill had after the division:	3 4	8										
Number Bill had in the beginning:												
Number Bill gave Jim:	1											

A group of five boys and girls spent Saturday afternoon wrapping bandages for the Red Cross. While walking home, they talked about how fast they worked.

Alice said that she wrapped three bandages every four minutes.

"Well," said Ben, "it took me only three minutes to wrap two bandages."

Kathryn said that it took her six minutes to wrap five bandages. Paul reported seven bandages in nine minutes.

"I wrapped nine in twelve minutes. Isn't that the best record?" said Jerry.

Who had the best record?

Number of bandages Alice wrapped	3 4	6										
Time in minutes												
Number of bandages Ben wrapped	2 3											
Time in minutes												
Number of bandages Kathryn wrapped	5 6											
Time in minutes												
Number of bandages Paul wrapped	7 9											
Time in minutes												
Number of bandages Jerry wrapped	9 12											
Time in minutes												

Frank is a clerk in a candy store. Different kinds of candy are sold at different prices. No pennies are allowed in this store.

Chocolates are five cents each or one for five cents. Licorice sells at three pieces for five cents. Peppermints are sold two for five cents;

and gum drops are four for five cents. There are five pieces of butterscotch in each five-cent purchase. Pieces of butterscotch sold, therefore, at five pieces for five cents.

Frank decided to make a chart so he would not make mistakes.

Number of chocolates	1	—	—	—	—	—	—	—	—	—	—
Price in cents	5	—	—	—	—	—	—	—	—	—	—
Number of peppermints	—	—	—	—	—	—	—	—	—	—	—
Price in cents	—	—	—	—	—	—	—	—	—	—	—
Number of licorice sticks	—	—	—	—	—	—	—	—	—	—	—
Price in cents	—	—	—	—	—	—	—	—	—	—	—
Number of gum drops	—	—	—	—	—	—	—	—	—	—	—
Price in cents	—	—	—	—	—	—	—	—	—	—	—
Number of pieces of butterscotch	—	—	—	—	—	—	—	—	—	—	—
Price in cents	—	—	—	—	—	—	—	—	—	—	—

- a. Marcia bought eight pieces of candy and spent less than 15 cents. What did she buy?

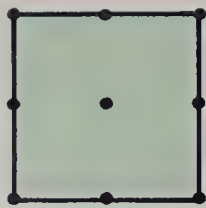
b. Stewart bought four pieces of candy for 10 cents and his sister bought 12 pieces for 20 cents. Did they buy the same kind?
- c. Jack spent a quarter and got 15 pieces of candy. Would he have had more pieces if he had bought peppermints?

d. Henrietta bought 27 pieces of one kind. What did she buy?

Mary had saved cola bottle caps. One day she stacked them in piles of six. She decided to give them all to her younger brothers — one out of every two to Phil, one out of every three to Bob, and the rest to Dick. Make a chart showing how the division might go.

Possible totals		Phil	Bob	Dick	B + D	P + D	P + B
e.	6						
f.	12						
g.							
h.							
i.							
j.							

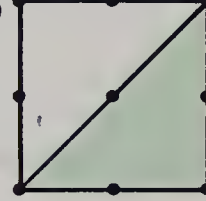
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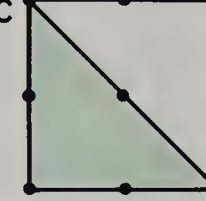


suggests 1

THEN the shaded area in each picture below suggests →

a  → $\frac{1}{2}$

b  → —

c  → —

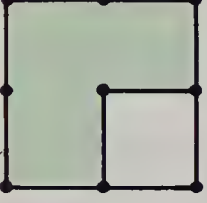
d  → —

e  → —

f  → —

g  → —

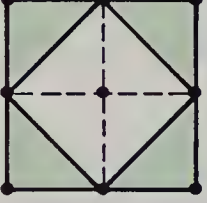
h  → —

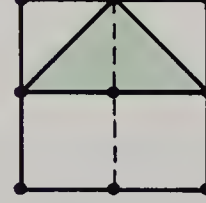
i  → —

j  → —

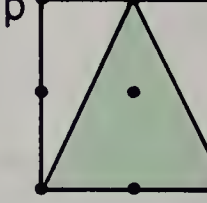
k  → —

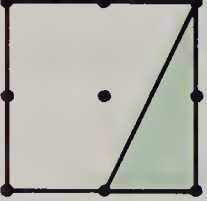
l  → —

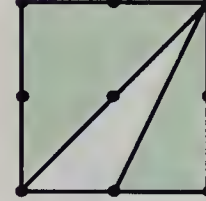
m  → —

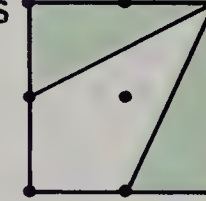
n  → —

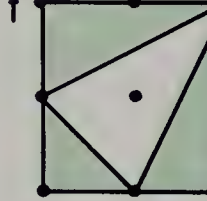
o  → —

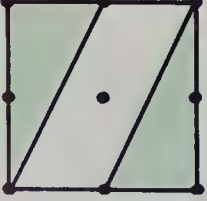
p  → —

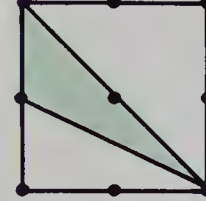
q  → —

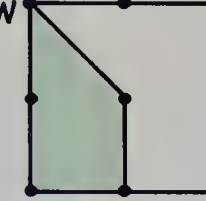
r  → —

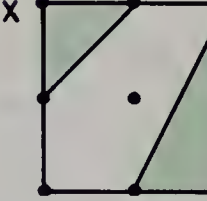
s  → —

t  → —

u  → —

v  → —

w  → —

x  → —

Hard work below!

The unshaded areas suggest →

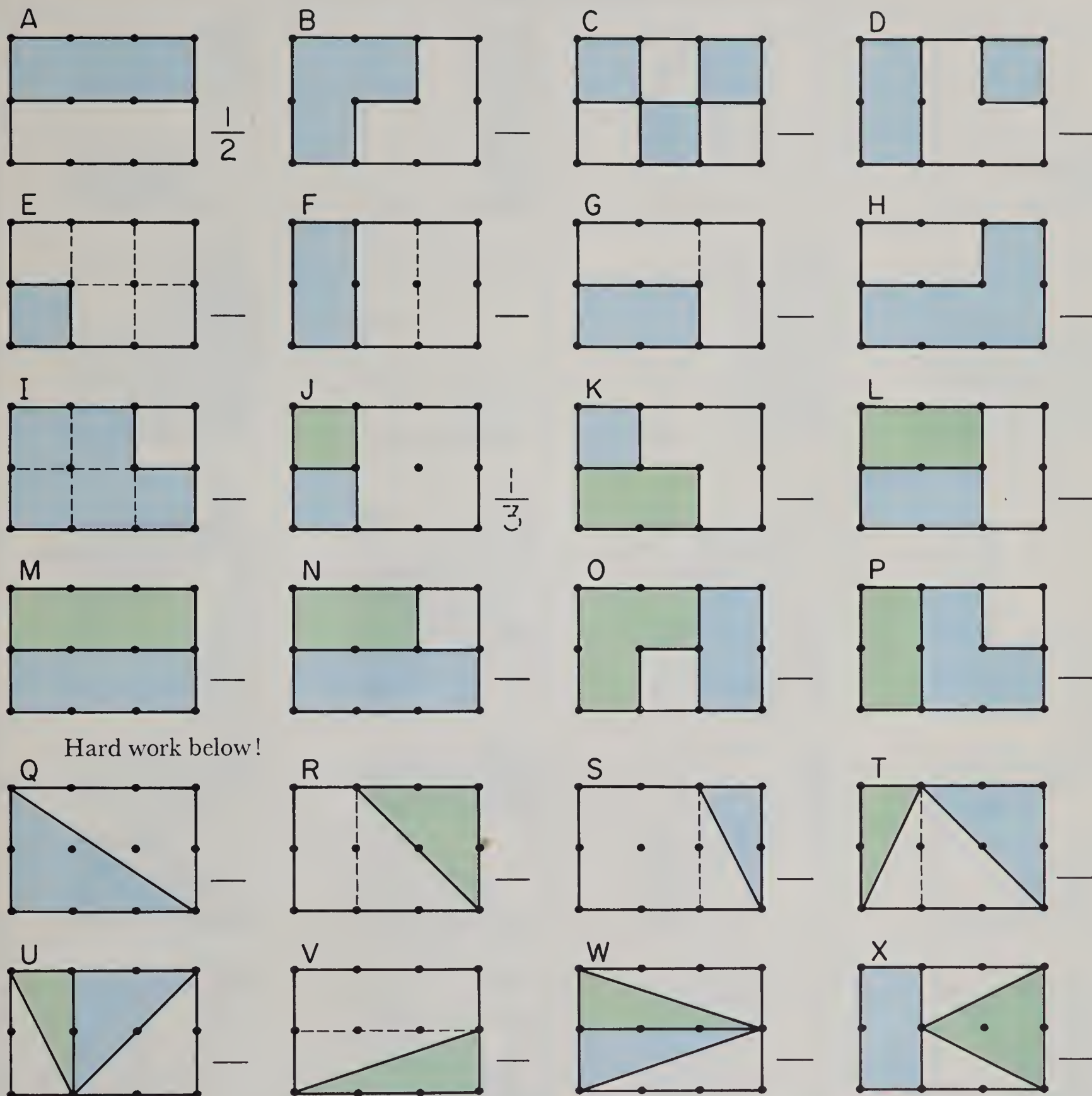
	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x
$\frac{3}{4}$	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

IF we agree that



suggests 1

THEN the shaded area in each picture below suggests



Hard work below!

The unshaded areas suggest

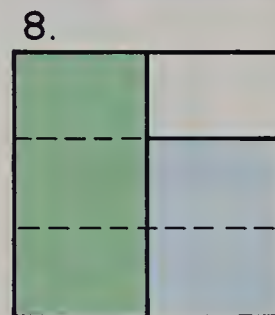
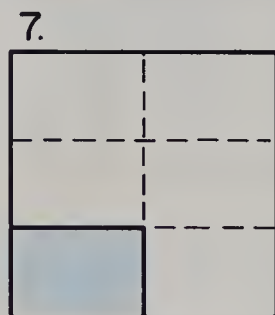
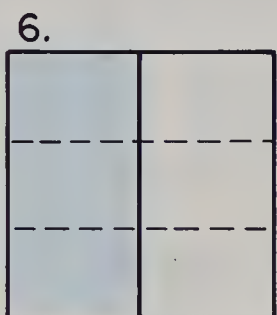
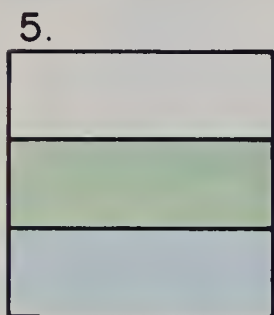
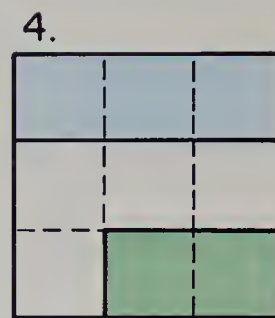
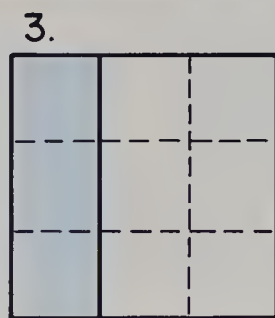
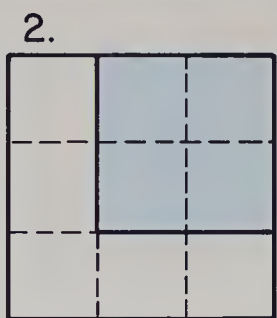
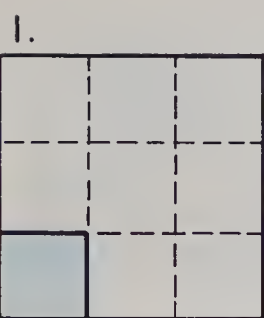
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	T	V	X
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

IF we agree that

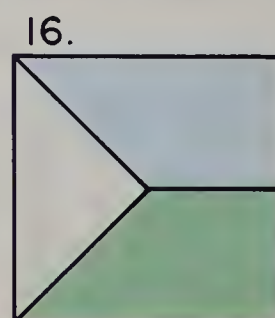
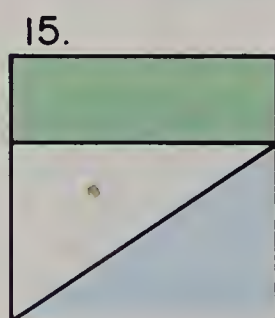
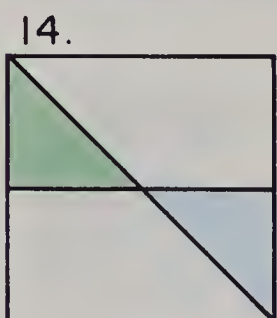
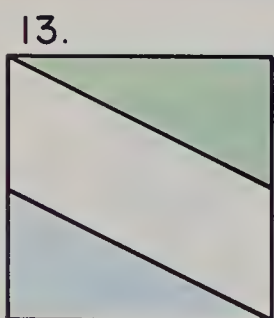
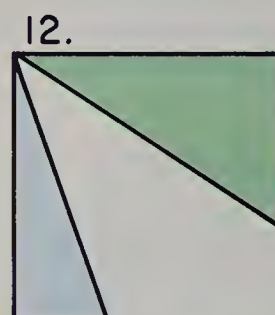
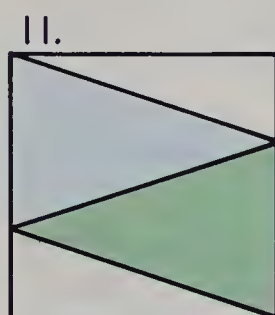
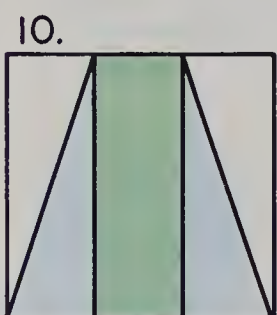
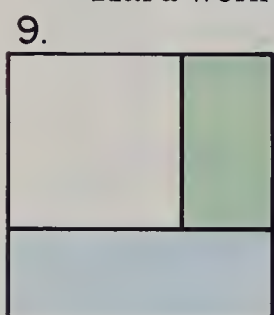


suggests 1

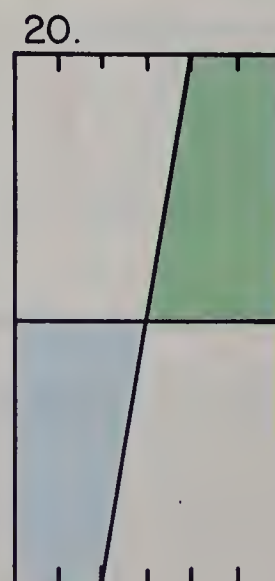
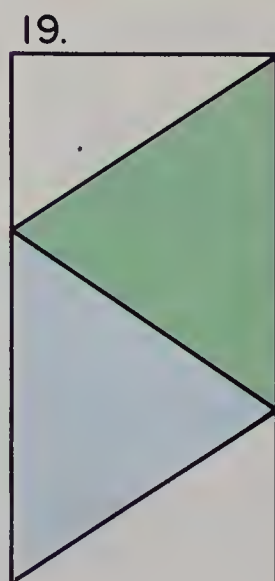
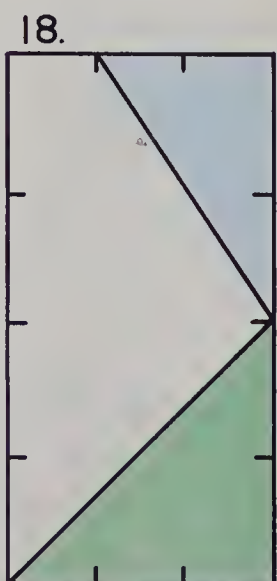
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$\frac{2}{2}$



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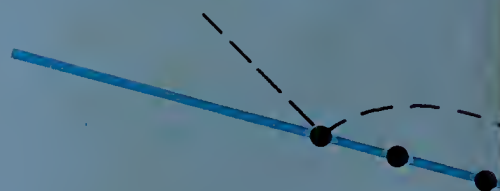
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